ENVIRONMENTAL ASSESSMENT FOR JOINT BIOLOGICAL POINT DETECTION SYSTEM (JBPDS) AT MULTIPLE TEST RANGES, EGLIN AIR FORCE BASE, FLORIDA

(RCS 02-680)

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Eglin Air Force Base, Florida

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FINDING OF NO SIGNIFICANT IMPACT
FOR
JOINT BIOLOGICAL POINT DETECTION SYSTEM
EGLIN AIR FORCE BASE, FLORIDA
RCS 02-680

Pursuant to the President's Council on Environmental Quality regulations for implementing the procedural provisions of the National Environmental Policy Act (40 Code of Federal Regulations 1500-1508), 32 CFR Part 989 and Department of Defense Directive 6050.1, the Department of the Air Force has conducted an Environmental Assessment of the probable environmental consequences for the testing of the Joint Biological Point Detection System (JBPDS) on Eglin Air Force Base (AFB), FL.

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Proposed Action: The proponent, Eglin AFB 46 Test Wing Operations Group, proposes to conduct Joint Biological Point Detection System (JBPDS) tests at multiple test ranges at Eglin AFB, FL. The requesting agency is the Air Force Operational Test and Evaluation Center Detachment 1 (AFOTEC Det 1), Kirtland AFB, NM. The proposed action would perform an operational test and evaluation of the Joint Biological Point Detection System (JBPDS). Multiple test sites on Eglin AFB would be utilized. These test sites are depicted in the EA at Figure 1-1. Eglin AFB is located in the Florida Panhandle between Pensacola and Panama City, and is bordered on the south by the Gulf of Mexico. The main test objective is to evaluate the detection system's performance to detect the presence of chemical and biological warfare agents by using several innocuous biological simulants and tracers. No agents would be utilized. The test would be conducted at naturally biologically-rich coastal, forest and grassland environments on Eglin. These test areas include the main base airfield and test ranges A-10, A-11, A-12, A-13, A-15, B-12, B-70, B-71 and C-72. Aerial dispersion of simulants and tracer gas will take place at test ranges B-12, B-70 and B-71. Challenges to the detection system will include both wet and dry aerosols and will consist of both long and short range ground releases. Aerial releases using crop duster-type aircraft, as well as ground point disseminations would occur at select ranges. Closed-box testing will occur on Santa Rosa Island (A-10, A-11, A-12, A-13 and A-15) and the McKinley Climatic Laboratory (using cold weather protocols). Descriptions of the simulants, tracers, obscurants and interferants are included in Chapter 2. Testing is anticipated to occur up to a maximum of six times per year for a period of five years.

Alternative Action 1: Alternative 1 would be identical to the proposed action except testing would take place at a subset of listed test ranges to include test areas A-15, B-12 and B-71. This subset would adequately meet AFOTEC's test objectives using the simulants and dispersion methods identified above.

No Action Alternative: The No Action alternative would be to not test the JBPDS at Eglin Air Force Base.

ANTICIPATED ENVIRONMENTAL EFFECTS

Anticipated environmental effects involving chemical and biological materials, hazardous materials, soils, water quality, wetlands and biological resources are discussed in Chapter 4 of the environmental assessment. Environmental analysis identified no significant impacts to human health or the environment.

MANAGEMENT REQUIREMENTS

Management requirements are described in Chapter 5 of the environmental assessment. The need for these requirements was identified by the environmental analysis and was developed through cooperation between the proponent and the interested parties involved in the proposed action.

FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the facts and the environmental assessment, I conclude that the proposed testing of the Joint Biological Point Detection System on Eglin AFB, Florida, will not have a significant adverse impact of a long-term nature to the quality of the human or natural environment. This analysis fulfills the requirements of the National Environmental Policy Act, the President's Council on Environmental Quality regulations, and 32 CFR 989. Therefore, an environmental impact statement is not required and will not be prepared.

13 Jun 2003
DATE

JAMES D. SIRMANS, GM-15
Director, Environmental Management

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

46 OG/OGMT	46th Operations Group Weapons Test Flight
96 AMDS/SGPB	96th Bioenvironmental Engineering Flight
96 CEG/CEF	96th Civil Engineers Group Fire Protection Division
96 CEG/CERX	96th Civil Engineer Group Long Range Plans
AAC	Air Armament Center
AAC/EMCE	Air Armament Center/Environmental Engineering Branch
AAC/EMH	Air Armament Center/Environmental Directorate/Cultural Resources Division
AAC/EM-PAV	Air Armament Center/Environmental Public Affairs
AAC/EMSN	Air Armament Center/ Natural Resources Branch
AAC/EMSP	Air Armament Center/ Environmental Analysis Branch
AAC/JAV	Air Armament Center/Staff Judge Advocate/Environmental Law
AAC/SEOG	Air Armament Center/Ground Safety
AAC/SEU	Air Armament Center/Range Safety
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOTEC	Air Force Operational Test and Evaluation Center
AOC	Area of Concern
BG	*Bacillus subtilis* var. *niger*
BHPO	Base Historic Preservation Office
BT	*Bacillus thuringiensis*
BTi	*Bacillus thuringiensis* var. *israelensis*
BTk	*Bacillus thuringiensis* var. *kurstaki*
BW	Biological Warfare
C	Celsius
CDC/NIH	Centers for Disease Control/National Institute of Health
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CY	Calendar Year
DoD	Department of Defense
DU	Depleted Uranium
EA	Environmental Assessment
EBSRA	Environmental Baseline Study Resource Appendices
EH	*Erwinia herbicola*
EHC	Environmental Health Criteria
EIAP	Environmental Impact Analysis Process
ESA	Endangered Species Act
F	Fahrenheit
FAC	Florida Administrative Code
FDA	U.S. Food and Drug Administration
FDEP	Florida Department of Environmental Protection
FFWCC	Florida Fish and Wildlife Conservation Commission
FNAI	Florida Natural Areas Inventory
ft	Feet
ft^2	Square Feet
FY	Fiscal Year
g	Grams
g/kg	Grams per Kilogram
g/L	Grams per Liter
GIS	Geographic Information System
HC	Hexachloroethane

LIST OF ACRONYMS ABBREVIATIONS, AND SYMBOLS CONT'D

HSDB	Hazardous Substance Database
ICM	Interim Corrective Measure
IDLH	Immediately Dangerous to Life and Health
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
JBPDS	Joint Biological Point Detection System
kg	Kilograms
km	Kilometer
L	Liter
lbs	Pounds
LCAC	Landing Craft Air Cushion
LDP	Legacy Debris Pit
LF	Landfill
m^2	Square Meters
mg/L	Milligrams per Liter
m/m^3	Milligrams per Cubic Meter
MS2	Enterobacteria Phage MS2
MSDS	Material Safety Data Sheet
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFA	No Further Action
NHPA	National Historic Preservation Act
NO_X	Nitrogen Oxides
OSHA	Occupational Safety and Health Administration
OT	Other Tank
OV	Ovalbumin
PEL	Permissible Exposure Limit
PM_{10}	Particulate Matter
POI	Point of Interest
RCRA	Resource Conservation and Recovery Act
RCW	Red-cockaded Woodpecker
RNA	Ribonucleic Acid
SF_6	Sulfur Hexafluoride
SHPO	State Historical Preservation Officer
SI	Site Investigation
$Si0_2$	Silicon Dioxide
SIP	State Implementation Plan
SO_X	Sulfur Oxides
TA	Test Area
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
U.S.	United States
ULV	Ultra-low Volume
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDOI	U.S. Department of the Interior
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compound

1. PURPOSE AND NEED FOR ACTION

1.1 PROPOSED ACTION

The Proposed Action is for the Air Force Operational Test and Evaluation Center (AFOTEC) to perform an operational test and evaluation of the Joint Biological Point Detection System (JBPDS) utilizing multiple test sites on Eglin AFB (Figure 1-1). Eglin AFB is located in the Florida Panhandle between Pensacola and Panama City and is bordered on the south by the Gulf of Mexico.

The main objective of the JBPDS is to evaluate the system's performance in detecting innocuous air-released compounds in several environments on Eglin Air Force Base. These environments include several different biologically rich coastal, forest, and grassland environments. These areas include the main operating airfield and test ranges A-10, A-11, A-12, A-13, A-15, B-12, B-70, B-71, and C-72. The air-released compounds include innocuous (harmless) biological simulants and tracers. Aerial (by airplane) dispersion of simulants and tracer gas will take place at test ranges B-12, B-70, and B-71. The wet and dry aerosol tests will consist of both long- and short-range ground releases, as well as aerial and point releases at select ranges. Closed-box testing will occur on Santa Rosa Island (A-10, A-11, A-12, A-13, and A-15) and McKinley Climatic Laboratory (using cold weather protocols), wherein the stimulant releases will be completely enclosed within a box structure. Test Area C-72 will be used as a command and control center. Innocuous biological simulants would include: *Bacillus subtilis* var. *niger* (BG), *Bacillus thuringiensis* (BT), MS2 (a bacteriophage), ovalbumin (OV), and *Erwinia herbicola* (EH). Aerial release will consist of benign simulants BG and OV only, with all other simulants released via ground dispersion methods. Tracers used will include propylene and sulfur hexafluoride gases (SF_6 gas). Interferants used to challenge the systems are kaolin dust, signal smoke, hexachloroethane smoke (HC smoke), burning diesel, burning rags, and burning vegetation. Testing is anticipated to occur six times per year for five years.

1.2 NEED FOR PROPOSED ACTION

Testing of the JBPDS and other detection systems is needed to challenge performance in multiple environments and in detecting simulants when interferants are present. These tests are intended to simulate, to the greatest extent possible, the real-world conditions in which the system would need to operate. National military strategy specifies a worldwide force protection capability that requires detection, identification, and treatment to protect U.S. forces against potential biological warfare threats. These capabilities proved deficient during Operation Desert Storm, resulting in the development of the JBPDS system to address this deficiency. With the potential for war overseas in a country that is suspected to harbor biological warfare agents, this technology may also serve an important role in protecting American troops. Criteria for meeting operational environmental conditions are as follows:

- Location: Air Force Range
- Test Area Dimensions: 25 mile radius
- Ecoregion: Subtropical Division Outer Coastal Plain Mixed Forest Province
- Facilities: Capable of simulating very hot and very cold environments, -40 °F to 120 °F

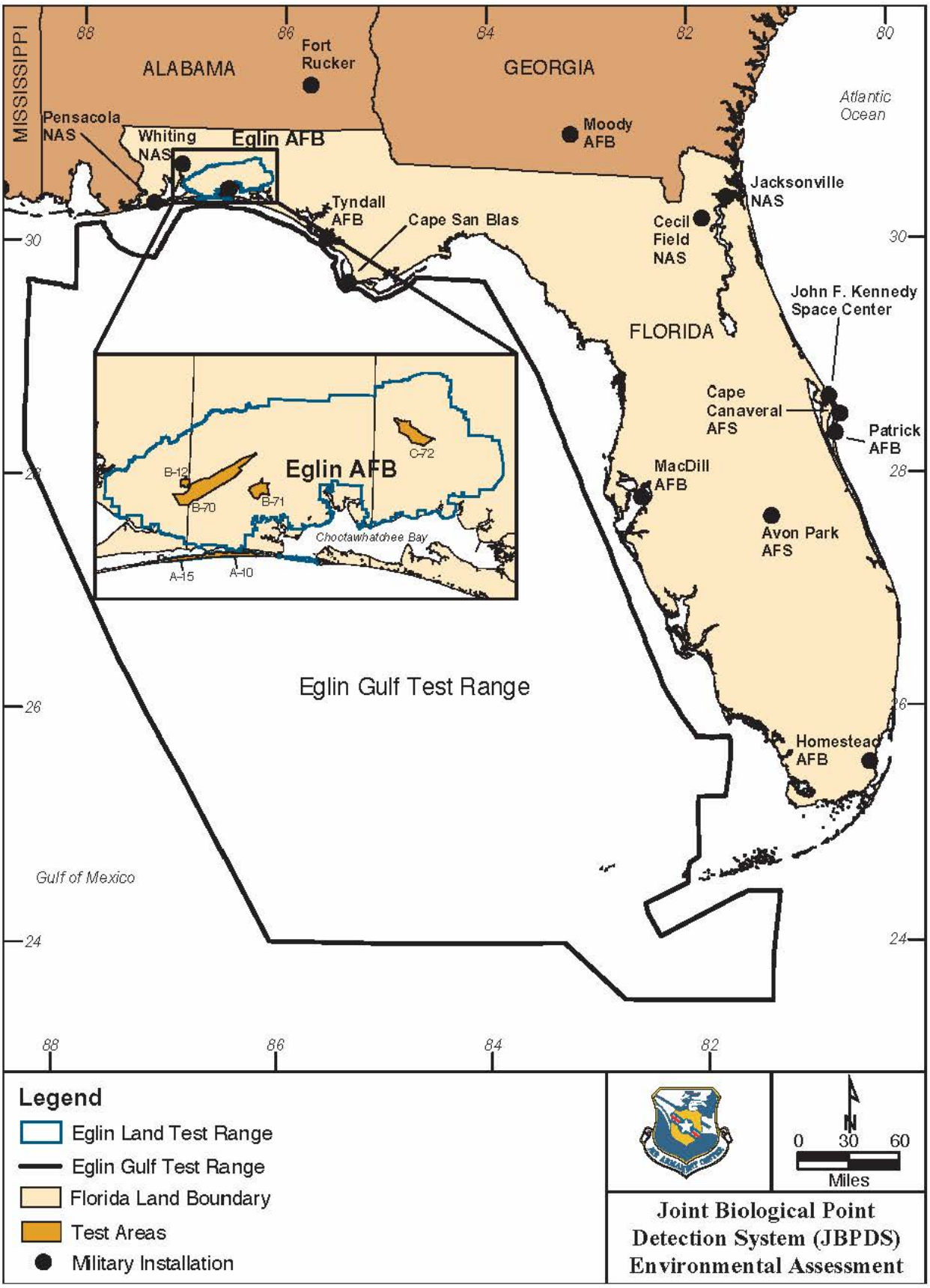


Figure 1-1. Location of Proposed Action (Panhandle/Eglin AFB)

1.3 OBJECTIVE OF THE PROPOSED ACTION

The main objective of the testing is to evaluate detection system performance against several biological simulants using obscurant materials at multiple test locations on Eglin AFB. The Eglin Range was selected from five Air Force ranges located within the Subtropical Division Outer Coastal Plain Mixed Forest Province that met the site selection criteria provided above.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

- Test Area B-70 Final Programmatic Environmental Assessment, Eglin Air Force Base, FL (U.S. Air Force, 1998)
- Overseas Environmental Assessment for Use of *Bacillus subtilis* var. *niger* (BG), Enterobacteria Phage MS2, and Sulfur Hexafluoride (SF_6) as Simulants and Tracer for Testing of Biological Agent Detection Systems, Point Mugu Sea Range, CA (U.S. Army and U.S. Navy, 2001).

1.5 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This document was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations of 1978, and 32 Code of Federal Regulations (CFR) Part 989. To initiate the environmental analysis, the proponent (46 OG/OGMT) submitted an Air Force (AF) Form 813, Request for Environmental Impact Analysis, to the Air Armament Center/Environmental Management Directorate, Stewardship Division, Environmental Analysis Branch (AAC/EMSP). A review of the AF Form 813 by EMSP determined that the Environmental Impact Analysis Process (EIAP) Working Group should address the Proposed Action. The Working Group consists of representatives from the Environmental Analysis Branch (AAC/EMSP), Environmental Engineering Branch (AAC/EMCE), Natural Resources Branch (AAC/EMSN), Historic Preservation Division (AAC/EMH), Bioenvironmental Engineering Flight (96 AMDS/SGPB), Environmental Law Division (AAC/JAV), Ground Safety (AAC/SEOG), Civil Engineering Readiness Flight (96 CEG/CERX), Environmental Public Affairs (AAC/EM-PAV), and Range Safety (AAC/SEU) functions at Eglin AFB.

1.5.1 Issues Eliminated from Detailed Analysis

Based on the scope of the Proposed Action and alternatives and preliminary analyses, the following issues were eliminated from further analyses.

Air Quality

Air quality with respect to those pollutants for which the Environment Protection Agency (USEPA) has promulgated national ambient air quality standards (NAAQS) and/or the Florida Department of Environmental Protection (FDEP) has promulgated an ambient standard was eliminated as a potential issue. A preliminary analysis of project generated air emissions was conducted to determine if:

- There would be a violation of NAAQS.
- Emissions would contribute to an existing or projected air quality violation.
- Sensitive receptors would be exposed to substantial pollutant concentrations.
- There would be an increase of 10 percent or more in Okaloosa County criteria pollutants emissions.
- Any significance criteria established by the Florida State Implementation Plan (SIP) would be exceeded.
- A permit to operate would be required.
- A change to Eglin's Title V permit would be required.

Under existing conditions, the ambient air quality in Okaloosa and surrounding counties is classified as attainment for all NAAQS as promulgated by USEPA.

The primary emission sources associated with the Proposed Action and Alternative Action are the release and generation of simulants and interferants (BG, BT, ovalbumin, tracer gases, dusts, and smokes) for each release scenario and vehicle activities associated with the test program.

Preliminary emissions calculations for activities associated with proposed test program under the Proposed Action and Alternative Action resulted in total emission values for the program as a whole of approximately 260 pounds of carbon monoxide (CO), 480 pounds of nitrogen oxides (NO_X), 600 pounds of particulate matter (PM_{10}), 20 pounds sulfur oxides (SO_X), and 920 pounds of volatile organic compounds (VOCs).

In accordance with Section 176(c) of the Clean Air Act, USEPA promulgated the General Conformity Rule that is codified at 40 CFR 51, Subpart W. The provisions of this rule apply to state review of all federal actions submitted pursuant to 40 CFR 51, Subpart W, and incorporated by reference at Rule 62-204.800, Florida Administrative Code. The Conformity Rule only affects federal actions occurring in nonattainment areas (areas that do not meet the NAAQS) and maintenance areas (areas that were classified as nonattainment but now are in attainment). Since the Proposed and Alternative Actions are located in an attainment area, the Air Force would not need to prepare a conformity determination for the Proposed or Alternative Actions at Test Area B-70.

For impact analysis, the estimated air emissions from the test program are compared to the Okaloosa County 2000 emission inventory. Potential impacts to air quality are then identified as the total emissions of any pollutant that equals 10 percent or more of the Okaloosa County pollutant emissions for that specific pollutant. The 10 percent criteria approach is used in the General Conformity Rule as an indicator for impact analysis for nonattainment and maintenance areas. However, for impacts screening in this analysis, a more restrictive criteria than required in the General Conformity Rule was used. Rather than comparing emissions from testing activities to regional inventories (as required in the General Conformity Rule), emissions were compared to the Okaloosa County inventory (a smaller area).

The estimated emissions are significantly less than 10 percent of Okaloosa County's emissions, and, therefore, would not be expected to cause any potential adverse affect on ambient air quality. Any emissions effects would be temporary and would fall off rapidly with distance from the test site. Due to the short-term effect of test-related interferant releases and fugitive combustive emissions from vehicles and the small area affected, there would be no potential adverse cumulative impact on air quality from test-related activities conducted under either the Proposed or Alternative Actions. Results are provided in Table 1-1.

Table 1-1. Emissions from Proposed Action (Tons)

Pollutant Emission Source	CO	NO_X	PM_{10}	SO_X	VOCs
JBPDS	0.13	0.24	0.30	0.01	0.46
Okaloosa County Total Emissions (CY2000)*	91,359.90	8,709.10	3,756.50	405.50	11,957.70**
Eglin AFB Total Emissions (CY2000)	95.40	117.70	114.60	17.00	105.70
Percent Change Okaloosa County	0.00	0.00	0.01	0.00	0.00

The release of the simulants BG, BT, ovalbumin, MS2, EH, and other stimulants and dispersants is not expected to adversely impact air quality, as they will be released intermittently and in small quantities (66 pounds at the most). In addition, they are classified as nonpathogenic substances. Detailed discussions regarding the toxicological aspects of these simulants can be found in Sections 2 and 4 of this document.

Noise

Detection system testing activities, including the use of air, ground, and water craft and generators for spraying simulants and interferants, would produce noise. However, given that the actions would take place on remote test ranges and locations on Eglin AFB already subject to elevated levels of noise production (Eglin Main Base Flight Line and Climatic Laboratory), noise would not be expected to have an impact on resources.

Noise associated with the Proposed Action would result from the landing craft air cushion (LCAC) landing on the beach and from the use of generators on Santa Rosa Island, and from the use of a crop duster aircraft during aerial dispersion of simulants during testing. LCAC movement would not take place near populated areas and, therefore, would not present a noise issue to the public. The use of aircraft would occur within Eglin special controlled airspace above active test areas (Figure 1-1), well away from populated areas. Additionally, the use of a small aircraft a few times per year would not significantly contribute to the current noise environment of Eglin AFB. Given these factors, noise impacts to the public from the use of an LCAC on the beach and a small aircraft for test support over active test areas are not anticipated. Therefore, noise impacts to the public were not considered for further analysis.

Safety/Restricted Access

McKinley Climatic Laboratory (A-23), Eglin main operation airfield, and test ranges A-10, A-11, A-12, A-13, A-15, B-12, B-70, B-71, and C-72 are established closed areas. Therefore, no public access restrictions are expected as a result of this action.

Safety/public health issues associated with the simulants and interferants are covered under the Chemical and Biological Materials/Hazardous Materials section.

Environmental Justice

Environmental justice addresses the potential for a proposed federal action to cause disproportionately high and adverse health effects on minority populations or low-income populations. Since the proposed activities would take place at Eglin AFB test areas, and there are no anticipated impacts beyond the test area boundaries, no environmental justice issues are anticipated.

Socioeconomic Resources

Potential impacts associated with the detection system testing activities, including noise effects, simulant and interferant clouds, and any other potential influences would be restricted to the McKinley Climatic Laboratory; the main operating airfield, and test ranges. Impacts to the socioeconomic environment adjacent to the Eglin reservation are not anticipated. Socioeconomic receptors would not be impacted by the testing activities, as testing would not impact resources outside reservation boundaries. Since no potential socioeconomic impacts are anticipated, socioeconomic resources were eliminated from any further analysis.

1.5.2 Issues Studied in Detail

Preliminary analysis, based on the scope of the Proposed Action and alternatives, identified the following potential environmental issues warranting detailed analysis:

Chemical and Biological Materials/Hazardous Materials

Chemical materials encompass a broad category of liquid, solid, and gaseous substances that are released into the environment as a result of mission activities. These include organic and inorganic materials that can produce a chemical change or toxicological effect to an environmental receptor. The chemical materials of interest for the JBPDS testing are the simulants, tracers, and obscurants listed in the Proposed Action. Analysis examines the safety and contamination concerns for these materials.

Soils

The simulants and interferants used in JBPDS testing may potentially cause soil contamination. As a result, contamination potential of these materials was determined. Additionally, off-road vehicle use on test areas may result in erosion impacts to soils. LCAC landings on Santa Rosa Island may cause soil erosion. Analysis of potential impacts to soils focused on identifying

action areas, analyzing the potential for impacts, and determining management options to avoid and/or minimize identified impacts.

Water Quality and Wetlands

Water quality may be impacted by the simulants and obscurants. Off-road use of vehicles could lead to erosion of slopes, resulting in degraded water quality and habitat. Issues analyzed include the pollutant capabilities of the simulants and interferants, locations of streams and wetlands on test areas, potential for those water bodies to be impacted, and management activities that can minimize or avoid these impacts.

Biological Resources

Biological resources may be affected by the Proposed Action and alternatives. Issues examined include potential impacts of detection systems, simulants, and interferants on wildlife and sensitive species. Analysis focused on identifying any sensitive species within the project area, analyzing the potential for impacts, and establishing management requirements for the avoidance and/or minimization of identified potential impacts.

Cultural Resources

Cultural resources are defined as archaeological areas and historical architectural properties. Potential impacts are identified if construction footprints associated with the Proposed Action extend into the boundaries of identified cultural resource areas, resulting in the disturbance of such resources through construction activities such as earth removal. Analysis focused on identifying potential cultural resource sites within or adjacent to the project area, evaluating the potential for impacts, and establishing management requirements for avoidance and impact minimization.

1.6 APPLICABLE REGULATORY REQUIREMENTS AND COORDINATION

The Florida Department of Agriculture was contacted regarding potential legalities/regulations regarding the use of innocuous biological simulants during innocuous biological simulant testing. The Department of Agriculture consulted with appropriate staff of the Florida Department of Environmental Protection and the Florida Department of Health, and their investigation found no outstanding issues to be addressed or intervening legalities/regulations relevant to ground testing of biological simulants on Eglin AFB (Clark, 2002).

The Florida Department of Environmental Protection has advised the proponent to allow for 48 hours between predicted or expected rainfall and planned use of *Bacillus thuringiensis* whenever possible due to runoff after heavy rain events (see Appendix E). The proponent will avoid use of these materials when there is a 70-percent or greater chance of heavy rainfall (>0.3 inches/hour according to the National Weather Service) occurring near the project area within 48 hours of the test.

The proponent will consult with the Legal Office, the Intelligence Directorate, and the AAC focal point for treaty compliance to determine requirements relevant to international treaties, if any. Additionally, coordination with the Eglin Airfield Manager is required prior to beginning any operations (personnel and/or equipment) near the Eglin flight line. An in-briefing on Airfield Safety Procedure is required. This will ensure proper flight line driving and radio procedures are briefed and are acknowledged. Airfield management must know the exact location of any equipment being used or left out on the flight line in support of these tests.

1.7 DOCUMENT ORGANIZATION

This environmental assessment follows the organization established by the Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1/500-1508). This document consists of the following:

1.0 Purpose and Need for Action

2.0 Description of the Proposed Action and Alternatives

3.0 Affected Environment

4.0 Environmental Consequences

5.0 Plan, Permit, and Management Requirements

6.0 List of Preparers

7.0 List of Contacts and Correspondence

8.0 References

Appendix A: Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials

Appendix B: BT Impacts Analysis

Appendix C: IRP Site Information

Appendix D: Florida Department of Agriculture Correspondence

Appendix E: Public Notice and Florida State Clearinghouse Review Comments

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

As required by federal regulation, this Environmental Assessment (EA) addresses the possible environmental impacts of the Proposed Action, including one alternative and a No Action Alternative. Section 2-6 provides a summary of the issues and potential impacts associated with the Proposed Action, Alternative 1, and No Action.

2.1 PROPOSED ACTION (PREFERRED ALTERNATIVE): DETECTION SYSTEM TESTING AT ALL LISTED TEST AREAS USING FULL RANGE OF SIMULANTS AND DISPERSION METHODS

The Proposed Action is for AFOTEC to test JBPDS during multiple test events at various test ranges on Eglin AFB. The JBPDS is designed to detect and identify threats in the field. Testing of detection systems will include dispersal of biological warfare (BW) simulants and challenges using interferants. Testing is anticipated to occur six times per year for 5 years. The list of simulants, dispersants, interferants and tracers and their quantities to be released into the environment during testing are listed in Table 2-1.

The testing will consist of deploying, employing, and sustaining the detection systems in multiservice military operations that include the Air Force, Army, Navy and Marine Corps. The initial system being tested, the JBPDS, will be deployed in three configurations: shelter, man-portable, and trailer mounted variants. Releases will take place from the ground (mobile or static disseminator) and from the air (aircraft). Release types will consist of the following:

- **Ground Line:** Ground releases of 400 meters or more from the JBPDS system in which a disseminator (release equipment) is moved by vehicle or manpower up or down some path (road) of dissemination.
- **Point:** Close ground releases (100 meters or less) in which the disseminator is not moved in a path but is stationary unless wind changes warrant movement.
- **Point Line:** Ground releases (400 meters or more from the JBPDS system) in which the disseminator remains stationary unless wind changes warrant movement.
- **Ground:** All ground disseminations associated with the above.
- **Aircraft:** Releases by a crop duster will occur. The aircraft will fly at the tree line at speeds between 75 to 80 knots. The aircraft will be based at Duke Field, where refueling, stimulant mixing, loading, and cleaning will be conducted.

Table 2-1. Chemical and Biological Material Quantities for JBPDS Testing

Material	Release Type	Number of Releases per Test	Amount per Release	Total Amount per Test	Total Amount per Year (6 tests)	Total Amount per 5-Year Period
Dry BG	Aerial	4	4 kg	16 kg	96 kg	480 kg
	Ground (Ground Line)	20	20 g	400 g, 0.4 kg	2.4 kg	12 kg
	Ground (Point)	100	1 g	100 g, 0.1 kg	0.6 kg	3 kg
Total Dry BG				16.5 kg	99 kg	495 kg
Wet BG	Ground (Ground Line)	20	20 L at 50 g/L	400 liters, 20 kg	120 kg	600 kg
	Ground (Point)	50	2 L at 5 g/L	100 L, 500 g, 0.5 kg	3 kg	15 kg
Total Wet BG				20.5 kg	123 kg	615 kg
Total BG				37 kg	222 kg	1,110 kg
Dry BT	Ground (Ground Line)	20	20 g	400 g, 0.4 kg	2.4 kg	12 kg
	Ground (Point)	100	1 g	100 g, 0.1 kg	0.6 kg	3 kg
Total Dry BT				0.5 kg	3 kg	15 kg
Wet BT	Ground (Ground Line)	20	20 L at 50 g/L	400 L, 20 kg	120 kg	600 kg
	Ground (Point)	50	2 L at 5 g/L	100 L, 500 g, 0.5 kg	3 kg	15 kg
Total Wet BT				20.5 kg	123 kg	615 kg
Total BT				21 kg	126 kg	630 kg
Wet EH	Ground (Ground Line)	8	30 L	240 L	1,440 L	7,200 L
Wet MS2	Ground (Ground Line)	8	20 L	160 L	960 L	4,800 L
Dry OV	Aerial	4	5 kg	20 kg	120 kg	600 kg
Dry OV	Ground (Point Line)	10	3 kg	30 kg	180 kg	900 kg
Total OV				50 kg	300 kg	1,500 kg
Cabosil	Ground	120	0.08 kg	10 kg	60 kg	300 kg
Syloid	Ground	120	0.04 kg	5 kg	30 kg	150 kg
Propylene Gas	Ground	30	10,000 L	300,000 L	1,800,000 L	9,000,000 L
SF_6	Ground	30	10,000 L	300,000	1,800,000 L	9,000,000 L
Kaolin Dust	Ground	15		10 kg	60 kg	300 kg
Signal Smoke	Ground	6		6 smoke pots	36 pots	180 pots
Hexachloroethane Smoke	Ground	18	1 grenade	18 grenades	108 grenades	540 grenades
Burning Diesel	Ground	10	1.5 liters	15 liters	90 L	450 L
Burning Vegetation	Ground	10	5 lbs	50 lbs	300 lbs	1,500 lbs
Burning Rags	Ground	10	8 lbs	80 lbs	480 lbs	2,400 lbs

Test ranges to be used include A-10 A-11, A-12, A-13, A-15, B-12, B-70, B-71, and C-72 (Figure 2-1). Additional testing of the detector units will be carried out in the vicinity of the Eglin Main Base Flight Line and at the McKinley Climatic Laboratory (A-23).

The test at the McKinley Climatic Laboratory (A-23) consists of climatological variation between very hot and very cold environments. A test of the JBPDS near the Eglin AFB Main Base flight line will be undertaken to evaluate the ability of the units to detect BW attacks through all the background hydrocarbons emitted during flight operations. For both of these test scenarios, BW simulants will be introduced into the JBPDS through an enclosed puffer unit that directs the simulants directly into the sampling ports.

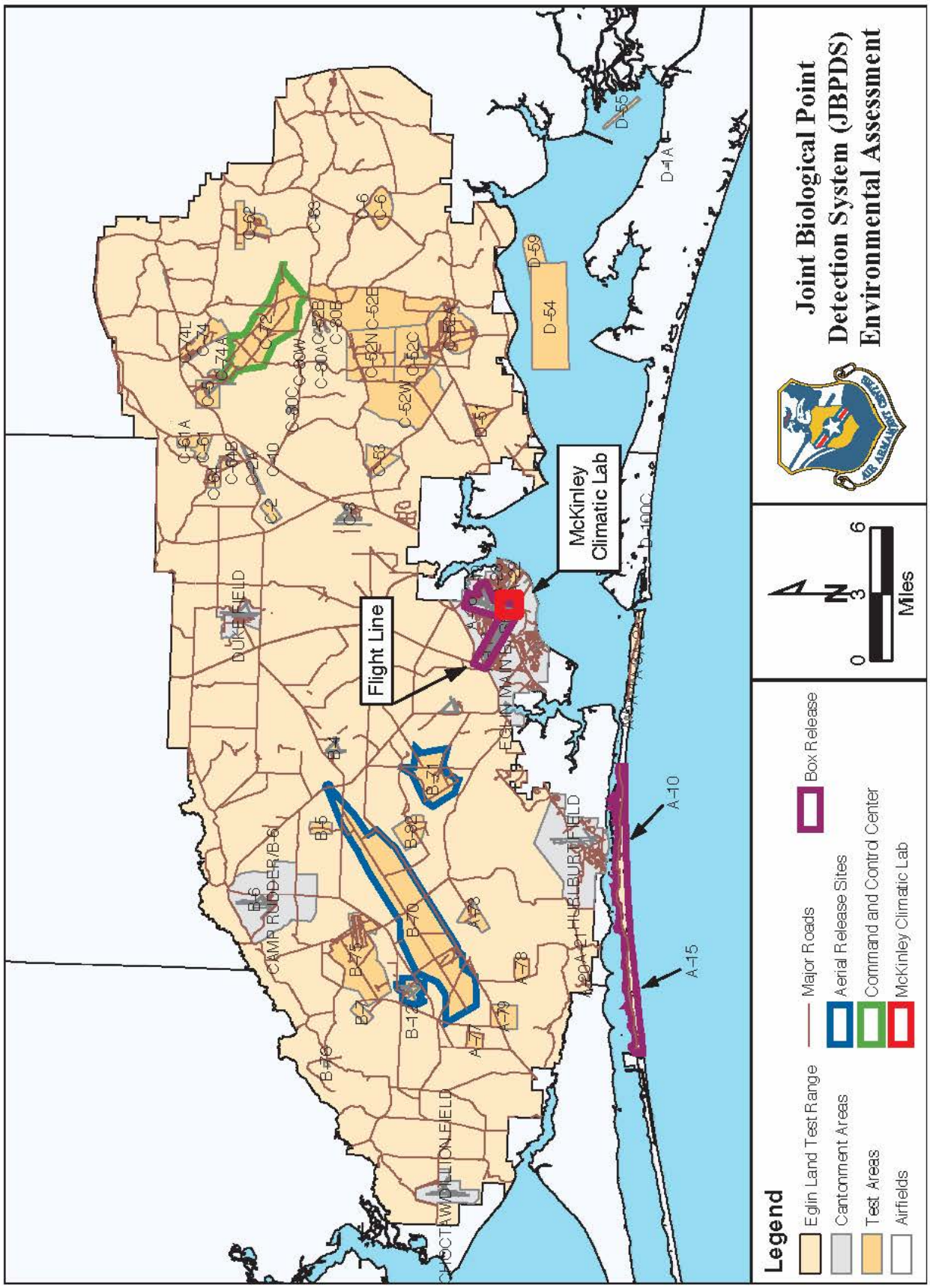


Figure 2-1. Location of Proposed Action

Test activities on Santa Rosa Island will also utilize the enclosed puffer units; no aerial simulant release will occur. A landing craft air cushion (LCAC) will transport the JBPDS to test area A-13B during daylight only, where the LCAC will come ashore and offload the JBPDS to trucks on the roadway. Units will be transported to various test areas and set up within test area boundaries (utilizing 10- by 10-foot areas) for approximately 3 to 4 days. Movement of equipment, personnel, and vehicles will only take place along established roadways and locations on the test areas.

Biological simulants would include *Bacillus subtilis* var. *niger* (BG), *Bacillus thuringiensis* (BT), MS2 (a bacteriophage), ovalbumin, and *Erwinia herbicola* (EH). The proposed simulants are nonpathogenic (not capable of causing disease) to healthy adult humans and are routinely used to test aerosol particle collection and detection devices. These innocuous simulants are used in place of real pathogens that cannot be released due to public health concerns.

Simulants dispersed during aerial release will take place over test ranges B-12, B-70, and B-71 (Figure 2-2). Crop dusters will be used for aerial dispersion of simulants below the tree line at 75 to 80 knots (McGhin, 2003). BT and EH will not be released aerially and will only be released by ground dispersion methods (point, line, etc.). Optimal weather conditions include wind speeds from 4-8 meters/second. Testing will not take place if wind speed exceeds 15 meters/second. BT and EH simulants will not be released outside a 0.5-kilometer buffer within the boundaries of Test Areas B-12, B-70, and B-71 (Figure 2-2).

Biological Simulants

Bacillus globigii reclassified as Bacillus subtilis var. niger (BG)

Bacillus globigii has been reclassified as a *Bacillus subtilis* species but is still identified with the BG acronym. Approximately 37 kilograms of BG would be released per test period. BG is an innocuous (harmless), nonpathogenic gram positive, aerobic, rod-shaped bacterium that grows in chains and readily forms spores. The bacteria are found naturally in soils worldwide and are most frequently spread by wind and dust storms. The rod is 2 to 10 micrometers in length and 0.7 micrometers wide. *B. subtilis* spores exhibit an aerodynamic diameter of approximately 0.9 micrometers and appear as 0.5- to 1.0-micrometer rods. It is commonly used as a simulant for pathogenic bacteria, in medical research as an indicator species, and in industry for a variety of applications. BG has been used and cultured at Dugway Proving Ground, Utah, as a biological simulant for more than 40 years (U.S. Army and U.S. Navy, 2001).

Bacillus thuringiensis var. kurstaki and var. israelensis (BT)

During JBPDS testing, a total of 21 kilograms of *Bacillus thuringiensis* var. *kurstaki* and var. *israelensis* could be used. BT is a naturally occurring, nonpathogenic soil bacterium that has cells containing endospores and crystals of an insecticidal protein toxin. It is manufactured and sold worldwide to control plant pests such as caterpillars, mosquito larvae, and black flies. BT represents about 1 percent of the agrochemical market (fungicides, insecticides, and herbicides), with commercial products containing mixtures of dried spores and toxin crystals. BT is applied to leaves and other environments where insect larvae feed.

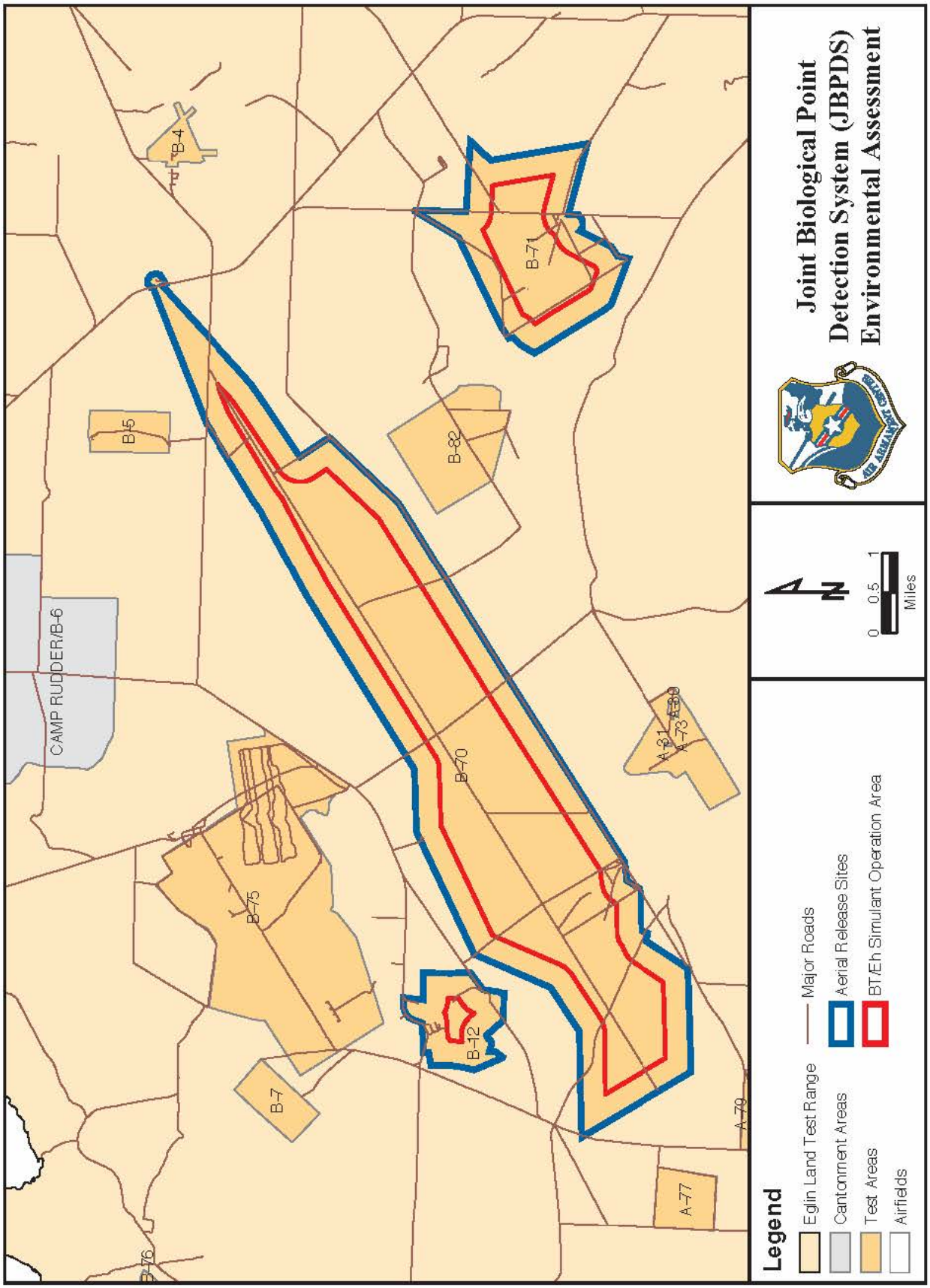


Figure 2-2. Location of Dispersion Sites (B-12, B-70, B-71)

There are several different strains of BT, each with specific toxicity to particular types of insects. BT var. *kurstaki* targets Lepidoptera (butterflies and moths), whereas BT var. *israelensis* is active against black flies, fungus gnat larvae, and some types of mosquitoes. The vegetative cells of BT are approximately 1.0 micrometer wide and 5 micrometers long and are motile. The crystals are aggregates of a large protein with a molecular weight of 130 to 140 kilodaltons (University of Edinburgh, 2002).

Ovalbumin

Approximately 50 kilograms of the abundant egg protein ovalbumin would be released during test activities. Ovalbumin is a natural, benign substance that consists of a glycoprotein (which is the major protein of egg white). It has a molecular weight of 4,500 daltons. The molecule consists of a polypeptide side chain of mannose (sugar) and glucosamine residues. The protein can be denatured (broken down) at 56 degrees Celsius (°C) (Worthington, 2002). In addition to being used as a biological simulant, it is employed as an immunological determinant (antibody testing) and for pharmaceutical processing.

Enterobacteria Phage MS2

It is estimated that about 160 liters of MS2 would be released per test period. The small ribonucleic acid (RNA) virus, MS2, does not cause disease in humans or animals and is used as a biological simulant for smallpox. MS2 infects *Escherichia coli* (*E. coli)* bacteria only and is found in the intestinal flora of mammals. Because it is encountered wherever fecal contamination occurs, it is commonly used as an indicator of water quality (U.S. Army and U.S. Navy, 2001).

Erwinia herbicola Reclassified as Pantoea agglomerans (EH)

Erwinia herbicola is considered an innocuous, nonpathogenic bacterium and has been reclassified under the name of *Pantoea agglomerans*. Approximately 240 liters would be dispersed during test activities. EH is found in orchards and is a common microflora on fruits and vegetables. Information is limited regarding this microorganism, although it is being studied at universities as a fungicide to control seed rot and fire blight. EH strain C9-1 produces an antibiotic that inhibits fire blight. However, there are no strains that have been approved by USEPA for commercial application (Steiner, 1998).

Dispersants

Cabosil

Cabosil is a synthetic, amorphous (unstructured), fumed silicon dioxide. Approximately 10 kilograms may be used with simulants to form an aerosol during dispersal. Because of its inert nature, it has been used as a thickening agent in food such as ketchup and commercial products such as shampoo, cosmetics and hand soap. When mixed with liquid resin, Cabosil functions as a resin thickener (flow control agent) and an antisettling, anticaking agent.

Syloid

It is anticipated that up to 5 kilograms of Syloid will be mixed with biological simulants to form an aerosol during testing. Syloid is a synthetic amorphous gel that serves as cost-efficient, multifunctional conditioning agent for pharmaceutical and personal care products. Syloid silicas are used for pigment dispersion, anticaking and thickening agents, carriers for active ingredients, suspension enhancers, oil adsorbents and gloss reducers.

Tracers

Propylene Gas

Approximately 300,000 liters of propylene gas will be released as a tracer to assist tracking biological simulant clouds during field tests. Propylene is colorless and has mild odor. It is heavier than air and will burn readily in the presence of oxygen. Propylene gas is an important feedstock in the petrochemical industry and is used in the production of polypropylene, acrylonitrile, propylene glycols, cumene, butyraldehydes, acrolein, and other products. It is highly flammable with mildly toxic effects

Sulfur Hexafluoride (SF_6 Gas)

SF_6 is used as an insulator in power brakes, as a trace gas and chemical simulant, and as an oxygen asphyxiant in aluminum foundry applications. Approximately 300,000 liters of SF_6 could be used during test activities as a tracer. It has been used in testing at Dugway Proving Ground with no resultant adverse environmental effects (U.S. Army and U.S. Navy, 2001).

Interferants

Kaolin Dust

It is anticipated that approximately 10 kilograms of kaolin dust would be dispersed during test procedures. Kaolin is naturally occurring fine, usually white clay resulting from extreme weathering of aluminous minerals that contain kaolinite as a principal constituent. The mineral has been used during previous "smoke weeks" on Eglin AFB to simulate battlefield dust. The dust is usually generated and dispersed by a high-velocity air stream generator.

Hexachloroethane (HC) Smoke/Signal Smoke—Smoke Pots and Grenades

Six smoke pots may be used during detection system testing to produce HC smoke. Smoke pots typically contain approximately 13.6 kilograms (30 pounds) of HC smoke mixture and produce smoke for 12 to 22 minutes. Approximately 18 M-8 grenades will be detonated to produce approximately 539 grams (1.2 pounds) of HC white smoke mixture, which typically burns for 2 minutes (U.S. Air Force, 1997).

HC smoke is a mixture of hexachloroethane, zinc oxide, and aluminum, and upon deployment it burns, releasing a dense white smoke containing amorphous carbon, zinc chloride and aluminum oxide. Small amounts of organic compounds are also released, but it is assumed that hexachloroethane is entirely consumed or is not transported in the smoke cloud (U.S. Air Force, 1997).

Burning Diesel Fuel

The use of approximately 15 liters of diesel fuel per test to produce interferant would be produced by combusting middle distillate oil (diesel fuel). Combustive emissions typically contain the following pollutants: carbon monoxide, nitrogen oxides, sulfur oxides, particulate matter, and VOCs (aldehydes and polycyclic aromatic hydrocarbons).

Burning Vegetation

Approximately 50 pounds of burning vegetation would produce combustive emissions. The instantaneous combustion products of burning vegetation include carbon dioxide, carbon monoxide, methane, nonmethane hydrocarbons, nitric oxide, methyl chloride, and various particulates.

Burning Rags

An estimated 80 pounds of rags would be burned to produce interferant smoke. Combustion products include carbon dioxide, carbon monoxide, nitric oxide, and particulates.

2.2 ALTERNATIVE 1: DETECTION SYSTEM TESTING AT A SUBSET OF THE LISTED TEST RANGES

Alternative 1 would be identical to the Proposed Action except testing would take place at a subset of listed test ranges to include A-15, B-12, and B-71. This subset would adequately meet AFOTEC's mission using the simulants and dispersion methods identified above and applying adequate environmental management conditions and to mitigate any potential impacts to the environment.

2.3 NO ACTION ALTERNATIVE

The No Action Alternative would be to not test the JBPDS at Eglin Air Force Base.

2.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

There are many test areas throughout the Eglin range and on other Air Force facilities. However, the listed project areas provide naturally biologically rich coastal, forest, and grassland environments to challenge the JBPDS. Test areas B-12, B-70, and B-71 are located within the Eglin Reservation, providing optimal locations for aerial dispersion of innocuous simulants.

2.5 COMPARISON OF ALTERNATIVES

Table 2-2 summarizes issues associated with the Proposed Action and Alternatives and potential impacts.

Table 2-2. Summary Matrix of Issues, Proposed Action and Alternatives, and Potential Impacts

Issue	Proposed Action	Alternative 1	No Action
Land Use	Activities to be conducted under the Proposed Action are within the parameters of the established land use of the test area; therefore land use conflicts are not likely to occur.	Same as Proposed Action	No Impact
Chemical and Biological Materials/ Hazardous Materials	It is not anticipated that usage of biological simulants and interferants tested during the Proposed Action would adversely impact human health when standard operating procedures are followed. Potential health effects (irritation, allergic reactions) would be to limited to on-site personnel who are sensitive to a specific material being dispersed. The use of protective equipment would alleviate potential impacts. The release of simulants and interferants would be short-term, minimal, and localized. Thus, the migration of biological and chemical materials to surrounding communities is highly unlikely.	Same as Proposed Action	No Impact
Soils	Although BT has a tendency to persist in soils, impacts on Eglin AFB should be short-lived due to the sandy, well-drained, low organic content of soils (which negate the potential for materials to persist). All activities would take place on established roads or concrete pads, so JBPDS testing would not involve the displacement of soil. LCAC landings would not cause soil erosion. Thus, no adverse impacts to soils are anticipated.	Same as Proposed Action	No Impact
Water Quality and Wetlands	Given the short duration of release and the extremely low quantities that would be emitted during JBPDS testing, in combination with the established buffers from water bodies (1,000 feet), and the use of drift reducers and adherence to safety standards, it is unlikely that there would be impacts to water quality from biological and chemical materials. Vehicles would not be driving within a 1,000-foot buffer of water, and no off-road vehicle use is expected during testing. There are no anticipated impacts from soil erosion.	Same as Proposed Action	No Impact
Biological Resources	Ovalbumin, MS2, BG, and EH have not been found to be pathogenic to wildlife or insects and are not anticipated to affect biological resources or sensitive species. Insects (moths, butterflies, and caterpillars) could be affected by BT, which is a biological insecticide. Nonpest insects and animals that feed on target species can also be affected by BT. Restricting the release of all simulants and interferants to outside a 1,000-foot buffer around water bodies should minimize effects to aquatic species. It is recommended that no north-south aerial releases at Test Area B-12 be performed to avoid potential impacts to RCW forage areas.	A 46% increase in activity at Test Areas B-12, B-70, and B-71 represents a direct increase in the amount of BT deposited. This alternative is less desirable than the Proposed Action.	No Impact
Cultural Resources	High-probability cultural resource areas are located on Santa Rosa Island (Test Areas A-10 to A-15). However, for JBPDS testing, equipment setup and personnel movement would occur only on established areas, such as paved or concrete pads and roads. Thus, no cultural resource impacts are anticipated.	Same as Proposed Action	No Impact

3. AFFECTED ENVIRONMENT

3.1 LAND USE

Eglin AFB is located on the Florida Panhandle between Pensacola and Panama City. It is bordered on the south by the Gulf of Mexico (Figure 1-1). Eglin AFB is composed of more than 724 square miles of land ranges and facilities and more than 86,500 square miles of water ranges in the Gulf of Mexico. It is approximately 0.8 miles and 1.5 miles southwest of Valparaiso and Niceville, Florida, respectively, and 4 miles northeast of Fort Walton Beach, Florida. U.S. Highway 85 and State Route 123 converge at Eglin Main. Eglin Main Base hosts the main testing, administrative, and living facilities, along with the major airfield, and is home to the Air Armament Center, a unit of the Air Force Materiel Command.

Eglin AFB supports approximately 50 associate units, including the 33rd Fighter Wing, Aeronautical Systems Center, Air Force Reserve (Duke Field), Air Force Special Operations Command (Hurlburt Field), Air Force Space Command (Space Surveillance), U.S. Army Ranger Bureau of Investigation, and Federal and Okaloosa County Prisons. The Eglin land reservation consists of 27 ranges and 10 auxiliary fields, of which three remain active: Eglin Main, Duke Field, and Hurlburt Field.

Eglin Main Airfield

Eglin main airfield is located in Valparaiso, Florida, and consists of two runways that are oriented north-south and northwest-southeast. The airfield is used for military missions and regional commercial airlines.

McKinley Climatic Laboratory (Test Area A-23, Building 440)

This facility tests weapon systems in climatic extremes, i.e., a temperature range from –65 to 165 degrees Fahrenheit (°F) and conditions of snow, rain, wind, ice, humidity, sand, dust, and salt fog. The largest of its six chambers is an insulated hangar with an enclosed volume exceeding 3 million cubic feet. What makes this facility unique is its ability to support testing that requires engine(s) running while operating aircraft systems to include the aircraft guns under these climatic conditions.

Santa Rosa Island (Test Areas A-10, A-11, A-12, A-13, and A-15)

Santa Rosa Island, located in the southern section of Eglin AFB in Okaloosa and Santa Rosa County, Florida, is a narrow barrier island approximately 50 miles long and less than 0.5 mile wide, separated from mainland northwest Florida by Santa Rosa Sound, a shallow lagoon varying in width from 400 to nearly 5,000 feet, and Choctawhatchee Bay. The island is bordered on the south shore by the Gulf of Mexico and on the north shore by Santa Rosa Sound and Choctawhatchee Bay. Eglin controls 4,760 acres of Santa Rosa Island, a 4-mile strip eastward of Fort Walton Beach open for public recreation, and a restricted access 13-mile section extending to the west to Navarre Beach, Florida. There are 2.5 miles of Okaloosa County property between the two parcels of Eglin property. Each of the three sections of island has unique characteristics

(developed versus undeveloped land), and 15 Eglin AFB test sites are located on Santa Rosa Island. Additional information on Eglin's Santa Rosa Island property is available in the *Environmental Baseline Study Resource Appendixes* (U.S. Air Force, 2002) and the *Integrated Natural Resources Plan, Eglin AFB, 2002-2006* (U.S. Air Force, 2002a).

Test Area B-12

Test Area B-12 includes Auxiliary Field 7, an operating airfield, hardened aircraft shelters, and a mock village used for low-altitude navigation and targeting infrared for night equipment operations. The range can be used for testing munitions (including precision-guided missiles and bombs) against simulated and real aircraft shelter and targets. Joint camouflage, concealment, and deception tests are performed to evaluate airborne reconnaissance equipment and targeting against concealed targets.

Test Area B-70

Test Area B-70 consists of a 13- by 1.25-mile predominantly cleared area (10,792 acres) located 15 miles northwest of Eglin Main (Figure 1-1). This test area is used for shallow water mine countermeasures and includes a 1,500- by 3,000-foot grassy area with two ponds, an 11-million-gallon fill pond and an 8-million-gallon test pond. Uncleared areas include approximately 1,100 acres of partially cleared regions and 400 acres of densely vegetated regions located along the B-70 perimeter. The cleared areas consist of target areas, roadways, towers, and buildings established over the grassy plains and vegetation species of broomsedge, switch grass, grasses and herbs, and some low-growing shrubs. Ground cover over the cleared areas of B-70 is routinely (approximately every 2 years) maintained by several methods, including bush hogging, roller chopping, prescribed burns, and/or mowing. The uncleared, densely vegetated areas contain forests of longleaf pine, sand pine, live oak, and turkey oak belonging to the Sandhills Ecological Association, described in Section 3-5.

Test Area B-71

Test Area B-71 includes a submunitions and incendiary weapons area. The submunitions portion of B-71 is a 2,000- by 4,000-foot asphalt-covered plot. Ground equipment is used to simulate aircraft-mounted hardware from which submunitions are released to evaluate ballistic characteristics. B-71 is also used for hazard classification tests.

Test Area C-72

This test area is used for developmental and production testing of conventional munitions, ranging from submunitions to 2,000-pound bombs and missiles. This test area includes equipment to support ground tests of aircraft launchers, rockets, and dispensing systems; various scoreable targets including a 1,500-foot runway in the center of the range; and a general purpose area with flight line markers used for strafing, guns, mines, rockets, and guided-missile tests. One permanent and one portable weather station are located at this test area.

3.2 CHEMICAL AND BIOLOGICAL MATERIALS/HAZARDOUS MATERIALS

Under the Proposed Action, simulant releases would include: *Bacillus subtilis* var. *niger* (BG), *Bacillus thuringiensis* (BT), MS2 (a bacteriophage), ovalbumin (OV), and *Erwinia herbicola* (EH). Interferant materials would include kaolin dust, HC smoke, burning diesel, burning vegetation and rags. Dispersants used to facilitate dispersion of simulants include Cabosil, and Syloid. Propylene gas and Sulfur hexafluoride gas (SF_6) will be used as tracers prior to simulant release. Descriptions of the materials and their ingredients can be found in respective sections of Chapter 2.

According to the Resource Conservation and Recovery Act (RCRA), Section 6903(5), hazardous materials and waste are defined as substances that, because of "quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to increases in mortality or serious illnesses, or pose a substantial threat to human health or the environment." Hazardous materials as referenced here pertain to mission-related hazardous chemicals or substances meeting the requirements found in 40 CFR 261.21.24, are regulated under RCRA, and their use is guided by AFI 32-7042. The hazardous materials to be transported and used on site for the Proposed Action and Alternative 1 consist of constituents used for interferant testing with smoke grenades, diesel fuel, and the biological simulant BT.

Biological simulants, *Bacillus thuringiensis* and *Erwinia herbicola* (*Pantoea agglomerans*), when used as pesticides, are governed by the Federal Insecticide, Fungicide, and Rodenticide Act, which regulates their sale and use in the United States. The law requires private and federal facilities to properly label containers; train workers; follow protection standards; safely manage, store, and dispose of; and keep accurate records of these materials.

Installation Restoration Program (IRP)

The IRP is used by the Air Force to identify, characterize, and remediate past environmental contamination on Air Force installations. Although widely accepted at one time, the procedures followed for managing and disposing of wastes resulted in contamination of the environment. The IRP has established a process to evaluate past disposal sites, control the migration of contaminants, identify potential hazards to human health and the environment, and remediate the sites. Regulations affecting IRP management at Eglin integrate investigative and remedial protocols of the CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) and RCRA processes, as well as state environmental compliance programs, primarily those found in the Florida Administrative Code (FAC) 62-770, Petroleum Contamination Site Cleanup Criteria. IRP sites are located within the proposed test areas and are listed in Appendix C. It should be noted that no digging or boring is associated with the Proposed Action.

3.3 SOILS

Eglin AFB is home to a diversity of soil types with unique physical and chemical characteristics that, in combination with a subtropical climate, partly determine the structure and function of ecosystems. The characteristics of geologic formation parent materials underlying Eglin AFB have a strong influence on soil formation and development.

3.3.1 Soil Series

There are approximately 63 soil series that compose the soil environment of Eglin AFB (to include Santa Rosa Island). Of these, 16 occupy total land areas of less than 50 acres, 43 occupy about 15 percent (74,409 acres), and four soils (Dorovan muck, Dorovan-Pamlico Association, Troup sand, and Lakeland sand) compose 84 percent of Eglin soils. Information on these four soils, as well as the Newhan-Corolla Complex (which composes most of Santa Rosa Island) is given below.

Lakeland Soil Series

The Lakeland series consists of very deep, very strongly acidic soils that formed in thick beds of eolian, fluvial, or marine sands on broad, nearly level to very steep uplands in the Lower Coastal Plain. Depth to seasonal water table is more than 80 inches. All horizons are sand or fine sand with 5 to 10 percent silt plus clay in the 10- to 40-inch control section. Slopes are dominantly 0 to 12 percent but range to 85 percent in dissected areas.

Dorovan Series

The Dorovan series consists of very poorly drained, moderately permeable soils on densely forested flood plains, hardwood swamps, and depressions of the Coastal Plains. They formed in highly decomposed acid-organic materials. Slopes range from 0 to 2 percent but are normally less than 1 percent. The organic material ranges from 51 to more than 80 inches thick. It is extremely acid or very strongly acid in the organic layers. It is strongly acid or very strongly acid in the 2C horizon. The soil is saturated to the surface most of the time. Runoff is very slow, and water is ponded on the surface in depressions. The underlying mineral sediments commonly are loamy or sandy and are very strongly acid or strongly acid.

Newhan Series

The Newhan series consists of excessively drained soils, rapidly permeable soils formed from sands deposited by wind. Runoff is slow. These soils are on gently undulating dunes commonly near beaches and waterways along the coast. Slopes are commonly 2 to 7 percent but range from 0 to 30 percent. The elevation of these soils commonly ranges up to about 75 feet or more above mean sea level. The soil consists of sand and shell fragments deposited mainly by wind along the Atlantic Coast. However, some areas are a result of dredge spoil material. Slopes range from 0 to 30 percent. Thickness of the A and C horizons is more than 72 inches. Reaction is extremely acid to slightly alkaline. Calcareous shell fragments mostly of sand size make up to 35 percent of the soil by volume. The soil contains few to common grains of dark minerals. Silt plus clay in the 10- to 40-inch control section is less than 5 percent.

Pamlico Series

The Pamlico series consists of very poorly drained soils that formed in decomposed organic material underlain by dominantly sandy sediment. The soils are on nearly level flood plains, bays, tributaries of major streams, and depressions of the Coastal Plain. Runoff is very slow, and flooding is rare to frequent. Permeability is moderate to moderately rapid in the organic layers

and slow to very rapid in the mineral layers. Slopes are less than 1 percent. Pamlico soils have 16 to 51 inches of organic material over dominantly sandy sediments. Reaction is extremely acid in the organic layers, and ranges from extremely acid to strongly acid in the underlying mineral layers.

Troup Series

The Troup series consists of deep, somewhat excessively drained soils with thick sandy surface and subsurface layers and loamy subsoils. They formed in nearly level to steep unconsolidated sandy and loamy marine sediments on Coastal Plain uplands. Runoff is slow, and permeability is moderate in the Bt horizon and rapid in the A and E horizons. Slopes are dominantly 0 to 15 percent but range to 40 percent. Solum thickness is more than 80 inches. Reaction of the surface and subsurface layers ranges from very strongly acid to medium acid, except where limed, and from very strongly acid to strongly acid in the subsoil. Base saturation of the control section is less than 30 percent. Thickness of the A and E horizons ranges from 40 to 79 inches. Percent by volume of quartz gravel and ironstone nodules ranges up to 10 percent in the solum.

3.4 WATER QUALITY AND WETLANDS

3.4.1 Surface Water

Surface water is any water that lies above groundwater, such as ponds, rivers, streams, and springs. Surface water hydrology on Eglin AFB is directly linked to geology and geomorphology. Lakes, ponds, and wetlands occur where local shallow clay and silt layers restrict the downward movement of water to the regional water table (U.S. Air Force, 1995). The hydrologic characteristics of each drainage basin can be directly related to watershed geology and drainage density.

Streamflow remains fairly constant all year in the small streams on Eglin AFB because of a close relationship between groundwater and surface water (U.S. Air Force, 1995). Rainfall rapidly infiltrates the soil profile to recharge the shallow groundwater. The stored groundwater is released slowly to the surface water (Becker et al., 1989). There is an increase in drainage on the Eglin land range from the west to the east that results from higher elevations in the east. Also, there is an increased clay content and hardpan development in the soils and underlying sediments to the east. This produces lower permeability, more surface runoff, and attendant channel development.

Test Area B-12

The only surface water near Test Area B-12 is Holley Creek, which is located north of the test area (Figure 3-1). Holley Creek drains to the west into the Yellow River watershed. No bioassessment data were available for Holley Creek.

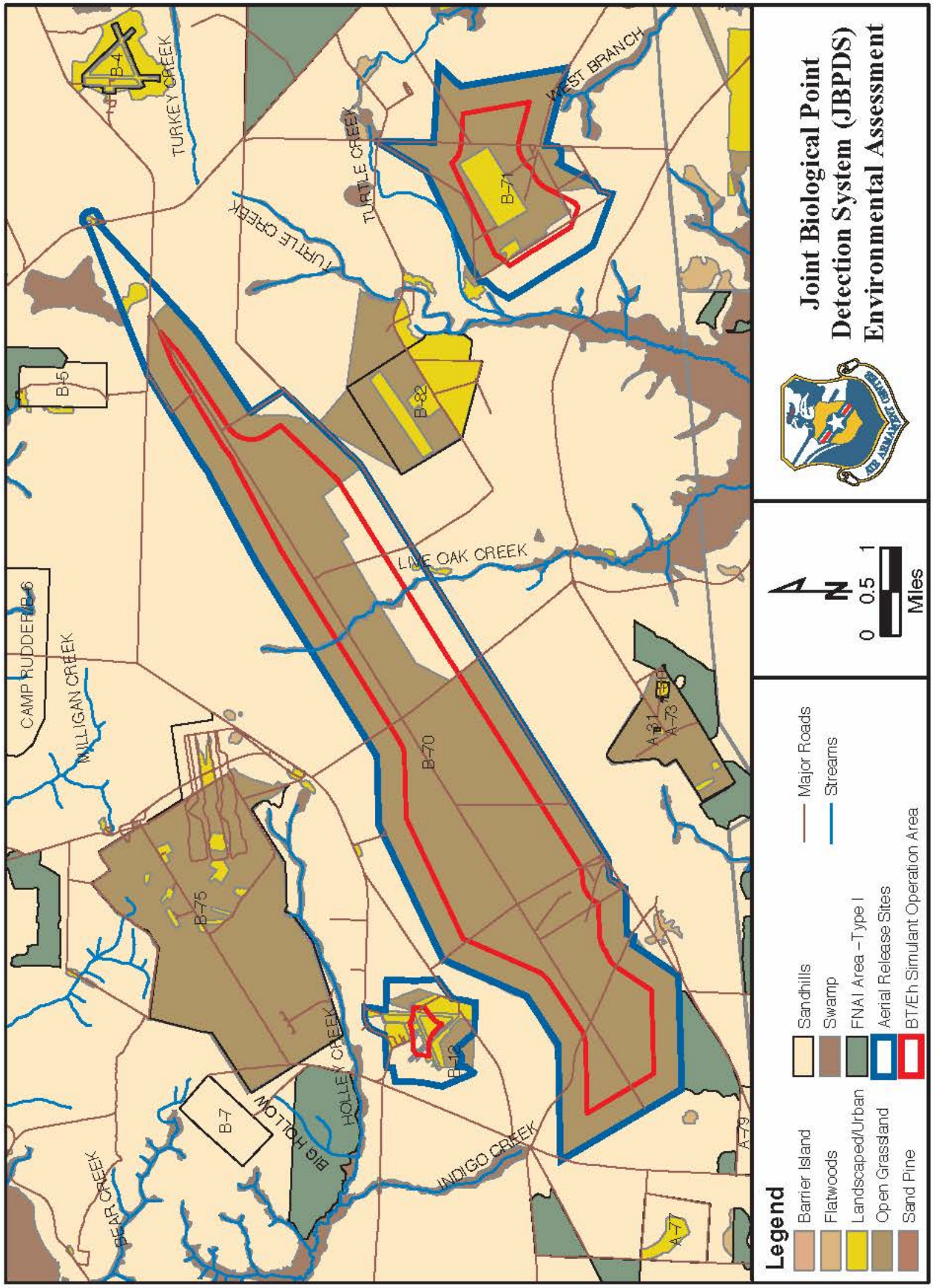


Figure 3-1. Ecological Associations – Test Areas B-12, B-70 and B-71

Test Area B-70

Most of Test Area B-70 drains south via the Live Oak Creek Watershed to the Pensacola Bay Drainage Basin, while the surface waters of the western third of B-70 flow north to the Yellow River Drainage Basin. Live Oak Creek, which is the only stream on B-70, begins just north of the test area and flows in a north/south direction across the center portion of the test area (Figure 3-1).

An August 2000 Florida Department of Environmental Protection (FDEP) biological assessment at Eglin Road 235 (location where Live Oak Creek flows out of B-70) indicated that the site did not meet Class III State Water Quality Standards 62-302 for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (FDEP, 2000). The BioRecon showed that the site had an impaired biological community and marginal habitat. Reasons given for impairment included altered hydrology from a culvert and road, and sediment from clay mining, dirt roads, forestry, and bombing at B-70 (FDEP, 2000).

The only natural wetland habitat at B-70 is Bull Pond, which is a temporary pond (Figure 3-1). Bull Pond is underlain by a local shallow clay layer that restricts the downward movement of water to the regional water table. Its wetted area ranges from 18.6 acres during extremely wet years to zero during dry years (U.S. Air Force, 1996). Generally, this pond goes dry annually to once every several years. Gopher frogs, which require semipermanent ponds that lack large predatory fish, are known to breed in Bull Pond (U.S. Air Force, 1995).

Test Area B-71

No streams flow through Test Area B-71, but Turtle Creek runs to the west of the test area, and West Branch begins just south of B-71 (Figure 3-1). Two unnamed ponds are located near the center of B-71.

BioRecon results from an FDEP bioassessment indicated that Turtle Creek at Eglin Road 181 (located immediately to the west of B-71) has a healthy biological community, but that its habitat is suboptimal (FDEP, 2000a). Turtle Creek at this site met Class III State Water Quality Standards 62-302 for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (FDEP, 2000a). Past clay mining, forestry practices, and dirt road management are the major sources of sediment to the stream, which is the main problem at this site. No bioassessment data were available for the West Branch site south of B-71.

McKinley Climatic Laboratory

One stream is located ~750 feet (0.14 mile) southwest of the McKinley Climatic Laboratory (A-23).

Eglin Main Operating Airfield

Tom's Creek flows just north of the Main Operating Airfield and drains into the Choctawhatchee Bay watershed (Figure 3-1). Several ponds/bayous that are located south of the Main Operating Airfield drain directly into Choctawhatchee Bay. No bioassessment data were available for Tom's Creek.

Santa Rosa Island (A Test Areas)

There are brackish ponds and many other small wetlands, but no natural surface freshwater bodies on Santa Rosa Island. After heavy rainfall, the ponds may become fresh for brief periods (USDOI, 1976). Likewise, no well-developed drainages exist, but numerous coves and inlets may be found along the northern edge of Santa Rosa Island.

Drainage systems are not designated for Santa Rosa Island. Based on topography, surface water either drains into Choctawhatchee Bay or the Gulf of Mexico. Surface water can also pond up in various wetland areas. Some precipitation is lost through the natural hydrologic processes of interception, depression storage, infiltration, evaporation, and transpiration. The remaining precipitation flows overland and through the soil, collects as flow in swales and small channels, and eventually becomes runoff to streams or other bodies of water.

3.4.2 Groundwater

The two aquifers located under Eglin are the Sand and Gravel Aquifer and the Floridan Aquifer. Eglin uses only a small amount of water from the Sand and Gravel Aquifer; however, the Floridan Aquifer is used extensively. The Floridan Aquifer is located below the Sand and Gravel Aquifer and extends beneath most of Florida.

Sand and Gravel Aquifer

The Sand and Gravel Aquifer consists of the Citronelle formation and marine terrace deposits that reach a maximum thickness of 1,200 feet at Mobile Bay, Alabama (U.S. Air Force, 1995). Although the aquifer is composed of clean, fine-to-coarse sand and gravel, locally it contains some silt, silty clay, and peat beds. The Sand and Gravel Aquifer is segregated from the underlying limestone of the Floridan Aquifer by the Pensacola Clay confining bed. Water in the Sand and Gravel Aquifer exists in generally unconfined (free water surface or water table conditions) and confined (under pressure) conditions (Becker et al., 1989). It is vulnerable to contamination from surface pollutants (Becker et al., 1989; U.S. Air Force, 1995). Pollutants enter the Sand and Gravel Aquifer by percolating downward through the sandy soils. They then migrate laterally in the groundwater and enter surface waters through base flow that provides most of the water to area streams and creeks. Wildlife habitat and vegetation provided by the streams are affected by the pollutants in the surface water (U.S. Air Force, 1995).

Where the aquifer is in direct contact with surface water, such as a stream or Choctawhatchee Bay, water table conditions occur (Becker et al., 1989). The water table is at or within a few feet of land surface in the Coastal Lowlands region. The water table occurs at considerable depth below the land surface in the Western Highlands (U.S. Air Force, 1995). Lakes and ponds occur where local shallow clay and silt layers restrict the downward movement of water to the regional water table (U.S. Air Force, 1995).

The quality of water in the aquifer has been rated good (i.e., meets its intended use) by the Florida Department of Environmental Protection (U.S. Air Force, 1995). Raw water has a pH ranging from 3.0 to 10.2 with an average pH of 4.9 in the upper zone and 7.2 in the lower (production) zone (U.S. Air Force, 1995). Average values for nitrate are 0.81 milligram per liter

(mg/L) in the upper zone and 0.11 mg/L for the lower zone. The iron content ranges from 0.07 mg/L to 95 mg/L with a median of 2.05 mg/L (U.S. Air Force, 1995). Water from this aquifer is not a primary source of domestic or public supply water on Eglin because of the large quantities of higher quality water available from the underlying Upper Limestone of the Floridan Aquifer (Becker et al., 1989; U.S. Air Force, 1995).

Floridan Aquifer

The Floridan Aquifer consists of a thick sequence of interbedded limestone and dolomites. Throughout the Eglin reservation, the Floridan Aquifer exists under confined conditions, bounded above and below by the Pensacola Clay confining bed. This clay layer restricts the downward migration of pollutants and restricts saline water from Choctawhatchee Bay and the Gulf of Mexico from entering the Upper Limestone layer of the aquifer. The clay layer of the Bucatunna Formation separates the Upper and Lower Limestone units. Because it is saline, the Lower Limestone unit is not used as a water source (U.S. Air Force, 1995). Groundwater storage and movement in the Upper Limestone layer occurs in interconnected, intergranular pore spaces, small solution fissures, and larger solution channels and cavities.

Water quality for raw water drawn from the upper limestone of the Floridan aquifer is of suitable quality for most uses. Water pH ranges between 7.5 and 8.5. Water temperature varies between 18 and 26 °C. Hardness as calcium carbonate is normally below 150 mg/L but can range up to 280 mg/L (U.S. Air Force, 1995). Chloride concentrations range between a norm of less than 10 mg/L to 25 to 75 mg/L in coastal areas (U.S. Air Force, 1995).

Groundwater Contamination

Contamination of the Sand and Gravel Aquifer has occurred through past base-related activities. Several base IRP sites report various amounts of pesticides, heavy metals, petroleum hydrocarbons and other compounds throughout the Eglin land test areas (U.S. Air Force, 1995). An area of concern (AOC) is associated with an inactive landfill on B-12. However, by decision of USEPA, no soil or groundwater sampling is slated for the future and no further action is to be taken at this site (U.S. Air Force, 1998). B-71 has one area slated as a point of interest (POI) for further action. No contamination has been reported for B-70. Groundwater contamination was not examined for Test Area C-72, McKinley Climatic Laboratory, Eglin Main Operating Airfield, or Santa Rosa Island because all testing at these sites will be conducted within plexiglass enclosures.

Potable Water Wells

Wells are not a concern at Test Area C-72, McKinley Climatic Laboratory, Eglin Main Operating Airfield, or Santa Rosa Island because all testing will be conducted within plexiglass enclosures. Table 3-1 details the use and depth of the wells located on Test Areas B-12, B-70, and B-71.

WR-88 at Test Area B-12 is located near the northern boundary of the test area. On B-70, WR-92 and WR-93 are located near the demolition ponds, WR-58 and WR-58-Old are located at the northwesternmost corner of Test Area B-70 near Copeland Tower, and WR-114 is located

near Test Area B-10. WR-B71 at Test Area B-71 is located near the southern boundary of the test area.

Table 3-1. Water Wells on Test Areas B-12, B-70, and B-71

Test Area	Well	Well Status	Well Class	Well Use	Water Treatment	Total Depth (ft)
B-12	WR-88	Used	Limited Use Public Supply	Potable	Chlorination	209
B-70	WR-92	Abandoned	N/A	N/A	N/A	183
B-70	WR-93	Abandoned	Industrial Use	Other	None	195
B-70	WR-114	Used	Limited Use Public Supply	Potable	Chlorination	148
B-70	WR-58	Used	Limited Use Public Supply	Potable	Chlorination	141
B-70	WR-58 Old	Abandoned	N/A	N/A	N/A	N/A
B-71	WR-30 OL	Abandoned	N/A	N/A	N/A	Unknown
B-71	WR-95B	Not Used	N/A	N/A	N/A	N/A
B-71	WR-B71	Used	Limited Use Public Supply	Potable	Chlorination	Unknown

Source: Sculthorpe, 2002

3.5 BIOLOGICAL RESOURCES

Biological resources include the native and introduced terrestrial plants and animals around Eglin AFB. The land areas at Eglin are home to unusually diverse biological resources, including several sensitive species, habitats, and wetlands. Eglin uses a classification system based on ecological associations that were developed based on floral, faunal, and geophysical characteristics. These ecological associations are described in the *Eglin AFB Integrated Natural Resources Management Plan* (*INRMP*) (U.S. Air Force, 2001) and the *Environmental Baseline Study Resource Appendices (EBSRA)* (U.S. Air Force, 1995). Seven ecological associations occur throughout the Eglin Land Test and Training Range: Sandhills, Sand Pine, Flatwoods, Open Grassland/Shrubland, Swamp, Barrier Island, and Landscaped/Urban (Figure 3-1).

3.5.1 Vegetation/Habitats

Biological resources include the native and introduced terrestrial plants and animals around Eglin AFB. The land areas at Eglin are home to unusually diverse biological resources, including several sensitive species, habitats, and wetlands. Eglin uses a classification system based on ecological associations. Ecological association classification is used to combine relatively large areas (thousands of acres) that are ecologically similar in floral, faunal, and geophysical characteristics. These five areas include the Sandhills, Wetlands/Riparian, Flatwoods, Barrier Island, and Grassland/Shrubland ecological associations. With the exception of the Flatwoods, all the ecological associations listed previously apply to the Proposed Action.

Summary descriptions of the applicable ecological associations are given in this section. Extensive and detailed information on all the ecological associations and their associative floral resources can be found in the *Eglin AFB Integrated Natural Resources Management Plan* (*INRMP*) (U.S. Air Force 2001), the Florida Natural Areas Inventory (FNAI), and Florida

Department of Environmental Protection (FDEP) *Guide to the Natural Communities of Florida* (FNAI, 1990), as well as the Eglin AFB *Environmental Baseline Resources Appendices* (U.S. Air Force, 1995). The narrative below for each area includes a description of the resources, historical land management practices, and their present status.

Various vegetative communities are found within these broad ecological associations. The *Guide to the Natural Communities of Florida* (FNAI, 1990) was used to describe the floral, faunal, and geophysical characteristics of these communities.

Sandhills Ecological Association

The Sandhills ecological association is underlain primarily by Lakeland soils. These soils are deep, sandy, and well drained, creating a dry condition. It is characterized by rolling sandhill ridges divided by streams and includes pockets of habitat ranging from steeply sloped to flat and xeric (dry) to mesic (moist) (U.S. Air Force, 1996). Loamy sands, sandy loams, clay loams, and muck soils are found in lower lying areas. Dominant trees include stands of longleaf pine and sand pine, along with oaks and magnolia. Low shrubs compose an important group and include saw palmetto, persimmon, dwarf huckleberry, gopher apple, and various oaks (U.S. Air Force, 1996). Vegetation surrounding ponds and the shoreline of creeks can include grasses and herbs or a dense shrub thicket. Typical plants include panicums, rushes, arrowheads, yellow-eyed grass, meadow beauty, and spike-rush. Floating plants such as water lilies can cover much of the water surface of quiet waters (U.S. Air Force, 1996).

Wetland and Riparian Ecological Associations

Wetlands and Riparian ecological associations on Eglin can be divided into the following categories: 1) wetlands dominated by plants adapted to anaerobic substrate conditions imposed by saturation or inundation for more than 10 percent of the growing season, 2) lacustrine wetlands that occur in nonflowing wetlands of natural depressions, 3) riverine communities which are natural, flowing waters from their source to the downstream limits of tidal influence and are bounded by channel banks, and 4) estuarine communities found along bays and bayous and consist of brackish waters. The above categories are further broken down into natural community types. Although acreage for each type has not been identified, approximately 60,809 acres of wetlands exist on Eglin, with approximately 1,158 miles of streams/riparian areas (U.S. Air Force, 1996).

Barrier Island Ecological Association

Barrier islands and beaches are typified by the following zones:

- Surf zone, where the waves crash on the beach
- Beach
- Primary dune system, which is the first set of dunes to occur
- Secondary dune system
- Swale, which occurs in the washout areas between the dunes
- Maritime forest

Dune and beach vegetation can be broken down into three distinguishable zones: shifting beach sands, produne vegetation, and scrub. The shifting beach sand zone is devoid of living, rooted vegetation and consists of seagrasses and other drifting plant debris washed onshore, collectively called seawrack (Wolfe and Reidenauer, 1988). The produne zone is inland of the shifting beach sand zone and is the first system of large dunes. Vegetation consists of pioneer plants that establish themselves in the shifting sands and salt spray. Dune plants may consist of sea oats, beach morning glory, and sea purslane, among others. Inland from the produne zone is the "scrub" zone. Vegetation found in this zone is usually stunted and wind/salt sprayed, consisting of shrubs, small scrubby oaks, and other small evergreens. A mixture of sand and slash pine usually dominates inland scrub and maritime forest communities (Wolfe and Reidenauer, 1988). Vegetation in the dune and beach environment is extremely sensitive to disturbance and requires long periods of time to become reestablished.

Open Grassland/Shrubland Ecological Association

This association is found on sites that are artificially maintained, such as the test areas. This ecological association is found in disturbed areas of the Sandhills ecological association. Mechanical methods and fire are employed to remove and prevent reestablishment of tall vegetation. Vegetative species included in this association are switch grass, broomsedge, bluestem, love grass, and woolly panicum. Riparian zones are found throughout these areas. Young scrub oaks can be found in areas that are no longer being maintained

Sensitive Habitats

The management of sensitive habitats is the responsibility of AAC/EMSN, Stewardship Division, Natural Resources Branch of the Environmental Management Directorate. Activities that may affect wetlands (protected by the Clean Water Act and Executive Order 11990) go through a permit process with the state as well as with the U.S. Army Corps of Engineers (USACE). Activities affecting wetlands are to be avoided if possible, and the planning process should reduce or minimize ground-disturbing projects or actions occurring in a wetland (U.S. Air Force, 1996). Wetlands are located in conjunction with Turtle Creek near B-71 and Live Oak Creek near TA B-70. Live Oak Creek, which is the only stream on TA B-70, begins just north of the test area and flows in a north/south direction across the center portion of the test area. Live Oak Creek was not listed as impaired under the 1998 303d list (FDEP, 1998), but an August 2000 biological assessment at Eglin Road 235 (location where Live Oak Creek flows out of TA B-70) indicated that the site did not meet Class III State Water Quality Standards 62-302 for recreation and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (FDEP, 2000). Reasons given for impairment included altered hydrology from a culvert and road and sediment from clay mining, dirt roads, forestry, and bombing on range B-70 (FDEP, 2000). Holley Creek and associated wetland areas are located 2,000 feet to the north of B-12. West Branch is adjacent to B-71, and receives drainage from a large (226-acre) asphalt test grid located in the center of B-71.

3.5.2 Wildlife

Eglin Reservation supports a rich diversity of game and nongame wildlife due to the variety of habitats found on the base. The ecological associations associated described previously may

provide habitat for birds, reptiles, amphibians, fish, and mammals. The characterizations provided below are not comprehensive or exclusive listings, since the species utilize a variety of communities (U.S. Air Force, 1996).

Sandhills Ecological Association

The barking tree frog and central newt are representative amphibians of the Sandhills ecological association. Leopard frogs are found in swales containing wetlands. Reptiles include the gray rat snake, coral snake, six-lined racerunner, eastern fence lizard, gopher tortoises, and box turtles. The armadillo, feral pig, and several types of squirrels (fox, gray, and flying) also live in the Sandhills. Characteristic predators include the gray fox and bobcat (U.S. Air Force, 1996).

Raptors include the screech owl, red-shouldered hawk, and great horned owl, which nest and hunt rodents in the woodlands of the Sandhills (U.S. Air Force, 1996). Other indigenous birds include warblers, vireos, red-cockaded woodpeckers (RCWs), pileated woodpeckers, white-breasted nuthatches, Bachman's sparrows, and pine siskins (bird).

Wetland and Riparian Ecological Associations

Wetlands support both aquatic and terrestrial organisms. Large varieties of microbes, vegetation, insects, amphibians, reptiles, birds, fish, and mammals can be found living in concert in wetland ecosystems. Through a combination of high nutrient levels, fluctuations in water depth, and primary productivity of plant life, wetlands provide the base of a complex food web, supporting the feeding and foraging habits of these animals for part of or all of their life cycle. During migration and breeding, many nonresident and transient bird and mammal species also rely on wetlands for food, water, and shelter.

Barrier Island Ecological Association

Most of the wildlife found in the coastal strand ecosystem occurs beyond the primary dune system due to hot, arid climate of the beach face and primary dunes. Reptiles are abundant in these environments. Typical reptiles found here include the black racer, the six-lined racerunner, and the pygmy rattlesnake. Mammals of the coastal strand include the Santa Rosa beach mouse, the cotton rat, the fox, and the raccoon. The coastal strand is also habitat for many shorebirds and gulls as well as a layover for many transitory migrant species (U.S. Air Force, 1995). Critical habitat designation for wintering and breeding grounds for the piping plover between Test Areas A-17 and A-18 exists on Santa Rosa Island. Piping plover critical habitat is a term (Endangered Species Act) that refers to specific geographic areas that contain the essential habitat features necessary for the conservation of threatened and/or endangered species. Santa Rosa Island is nesting habitat for several federally listed sea turtle species.

Open Grassland/Shrubland Ecological Association

Representative reptiles present in the clearings and grasslands include the eastern diamondback rattlesnake, the eastern coachwhip, the southern black racer snake, the gopher tortoise, the eastern box turtle, and the slender glass lizard. Gopher tortoises are part of a habitat that includes the sensitive indigo snake and gopher frog as well as several other species (U.S. Air

Force, 1996). The southern pocket gopher, cotton mouse, oldfield mouse, feral pig, and eastern cottontail rabbit are present in clearings and other similar habitats.

Raptors include the screech owl, red-shouldered hawk, and the great horned owl, which forage over the open areas (U.S. Air Force, 1996). The southeastern American kestrel preys on small rodents, reptiles, and insects in the clearings.

Soil Biology

Soil biology pertains to organisms that spend some part of their lifecycle in the soil. These organisms are classified as soil flora and soil fauna (University of Florida, 2002).

Soil Flora

Soil flora are classified as nonanimal and include plant roots, algae, fungi, bacteria, and actinomycetes (organism with characteristics of both bacteria and fungi) (University of Florida, 2002). Soil flora act as decomposers of organic material, are important constituents in plant nitrogen and nutrient cycles, and aid in the weathering of rocks. Fungi are important decomposers and are often responsible for increasing the efficiency of nutrient uptake by plant roots (University of Florida, 2002). Algae live at the soil-air boundary and some species usefully convert atmospheric nitrogen into a form usable by plants. Plant roots distribute organic matter to the lower levels of soil, help to break down rocks, create spaces for air to move through the soil, and facilitate the distribution of water into deeper parts of the ground (University of Florida, 2002).

Soil Fauna

Soil fauna are animals that live in the soil for some part of their life cycle, ranging from macroscopic animals that burrow such as earthworms to microscopic organisms such as mites, nematodes, and protozoans that live on soil particles or in the interstitial soil spaces (University of Florida, 2002). Earthworms promote soil aeration and mixing through burrowing activities, while millipedes and mites aid in decomposition of organic matter. Ants and termites are also soil mixers. Another type of worm, the nematode, parasitizes plants (University of Florida, 2002).

Sensitive Species

Sensitive species include those with federal endangered or threatened status, federal candidate species, and state endangered, threatened, and species of special concern status (U.S. Air Force, 1995). Conservation targets are a subset of all occurring terrestrial and aquatic communities or species of conservation concern that, if protected, are assumed to conserve all elements of conservation concern and a significant portion of biodiversity at a conservation area (The Nature Conservancy, 2001). Under this context, cornerstone species, such as the gopher tortoise, which provide habitat for other species such as the federally endangered eastern indigo snake, must be considered in this EA. Sensitive species, potential sensitive species habitat, and related conservation target species have been found near the Proposed Action locations. These species, their listing status, and their relative locations are listed in Table 3-2, while Figure 3-2 gives a graphical representation of selected species locations.

Table 3-2. Sensitive Species On or Near Proposed Action Locations

Sensitive Species	Habitat	Location	Proximity	
			On Site	W/in 1 Km
Federally Endangered				
Atlantic loggerhead turtle (*Caretta caretta)*	Nesting and hatching activities occur between the mean high water line and primary dune systems of the Santa Rosa/Okaloosa Island barrier island habitat of northwest Florida between early May and late October.	A-10, A-11, A-12, A-13, A-15	✔	
Atlantic green turtle (*Chelonia mydas)*				
Leatherback turtle (*Eretmochelys imbricata)*				
Okaloosa darter (*Etheostoma okaloosae)*	Found in six small Choctawhatchee Bay Basin tributaries located in the Sandhills ecological association of the Eglin Mainland Reservation.	C-72	✔	
Red-cockaded woodpecker (*Picoides borealis*)	Longleaf pine forests over most of Eglin AFB. Densities are high near ranges due to the beneficial effect of range fires controlling the underbrush in these areas.	B-12, B-70, B-71, C-72	---	✔
Federally Threatened				
Eastern indigo snake (*Drymarchon corais* couperi*)*	Sandhill winter dens are used from December to April, from May to July they shift from winter dens to summer territories, and from August through November they are frequently located in shady creek bottoms.	B-12, B-70, C-72	✔	
Piping plover (*Charadrius melodus)*	Isolated areas of Santa Rosa/Okaloosa Island are used as wintering grounds from mid-July through mid-May. Critical Habitat has been designated along the sound-side western most portion of the island.	A-10, A-11, A-12, A-13, A-15	---	✔
Conservation Targets (State-Listed Species)				
Gopher tortoise (*Gopherus polyphemus*)	Primarily found in longleaf pine and xerophytic oak woodlands in the Sandhills ecological association, but can also be found in sand pine scrub, live oak hammocks, dry prairies and coastal dunes in the Open Grassland/Shrubland and Barrier Island ecological associations	B-12, B-70, C-72	✔	
Florida burrowing owl (*Athene cunicularia* floridana)	Found in the Open Grassland/Shrubland ecological association. The owl inhabits prairie-like grasslands, such as those present on the airfields and cantonment areas at Eglin.	B-70	---	✔
Shorebirds Snowy plover (*Charadrius alexandrinus*) Least tern (*Sterna antillarum*) Black Skimmer (*Rynchops niger*)	Shorebirds use isolated areas of the island as wintering areas and for nesting.	A-10, A-11, A-12, A-13, A-15	---	✔
Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*)	Found only within the Barrier Islands ecological association, on the uplands of Santa Rosa Island		---	✔

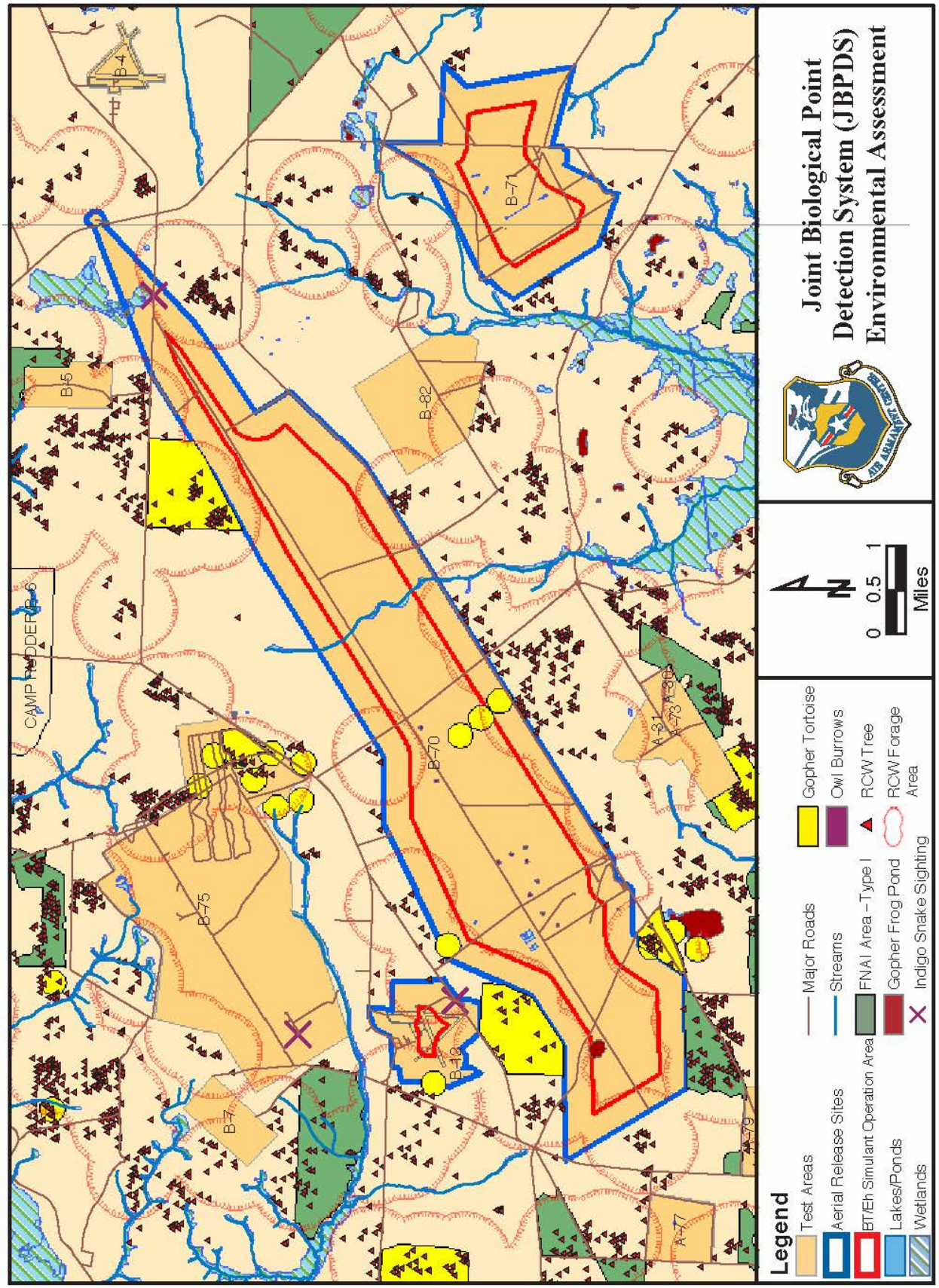


Figure 3-2. Sensitive Species – Test Areas B-12, B-70 and B-71

An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become endangered within the future throughout all or a significant portion of its range due to factors such as loss of habitat and anthropogenic effects. A candidate species is one for which the U.S. Fish and Wildlife Service (USFWS) has on file sufficient information on biological vulnerability to warrant a listing, but the listing is precluded at the present time. Once legally protected, it is a federal offense to "take" (import, export, kill, harm, harass, possess, or remove) protected animals from the wild without a permit. Federal candidate species should be given consideration during planning of projects, but have no protection under the Endangered Species Act. Similar regulations are in place for state-listed species (endangered, threatened, or species of special concern). While these state regulations do not apply on federal lands (U.S. Air Force, 2001a), Eglin, in 1992 along with the USFWS and the Florida Fish and Wildlife Conservation Commission (FFWCC), entered into a cooperative agreement to manage individual species on the installation, including both federal and state listed species.

Under 16 USC 1531 to 1544; 1997-Supp; Endangered Species Act 1973 (ESA), federal agencies must ensure that their actions (including permitting) do not jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify the habitat of such species without a permit, and must set up a conservation program. A Section 7 consultation with USFWS would be required if a take, which is defined as pursuing, molesting, or harming a protected species, were to occur. If the proposed action were likely to adversely affect a federally protected species, USFWS would determine whether jeopardy or non-jeopardy to the species population would occur. As a result, Air Force projects that may affect, either directly or indirectly, federally protected species, species proposed for federal listing, or critical habitat for protected species are subject to Sections 7 and 10 of the Endangered Species Act prior to the irreversible or irretrievable commitment of resources (U.S. Air Force, 1995). Eglin has developed an overall goal within the Integrated Natural Resources Management Plan to continue to protect and maintain populations of native threatened and endangered plant and animal species within the guidelines of ecosystem management (U.S. Air Force, 2001). Sensitive species potentially occurring within the region of influence of the proposed action are outlined in Table 3-2. Locations of sensitive species on and near B-70 are shown in Figure 3-2.

3.6 METEOROLOGY

The Eglin Military Complex is located in an area that is subject to warm, subtropical weather that lasts almost nine months out of the year and is characterized by an abundance of sunshine and rainfall, warm and humid summers, and mild winters. The climate in the local area may be considered semitropical, being dominated by maritime tropical air during the summer and continental polar air during the winter. There are two major seasons, summer and winter. Summer occurs from June through September and is characterized by high humidity and frequent air mass type thunderstorms. Winter occurs from September through March and is characterized by prevailing northerly winds with fairly frequent frontal passages or periods under the influence of semistationary frontal zones.

The proximity of Choctawhatchee Bay and the Gulf of Mexico, coupled with the upward sloping terrain, causes a land/sea breeze cycle that impacts Eglin and results in the formation of a line of

showers and thunderstorms almost daily during the summer. This line of coastal thunderstorms forms parallel to the coast 5 to 25 miles inland depending on the sea breeze strength. On any day that solar heating raises the land temperature above the Gulf temperature, a sea breeze will form. Under normal conditions, the sea breeze will start around 1000 hours local and then cease rapidly after sunset. At night, under similar conditions, when the land cools to a lower temperature than the Gulf, a land breeze develops. The land breeze usually begins around 2300 hours local and dies shortly after sunrise. This flow is the dominant weather situation during the summer months and is observable to some extent throughout the year.

Eglin AFB is vulnerable to tropical storms that originate in the South Atlantic and the Caribbean. The Atlantic hurricane season runs from 15 April through 30 November. In the Eglin area, the most likely months are August through October. Historically, this area experiences gale-force winds an average of once every 3 years and hurricane-force winds an average of once every 6 years. Weather associated with hurricanes includes tornadoes, high winds, and extremely heavy rain.

Overall, the Choctawhatchee Bay and the Gulf of Mexico moderate the climate of Eglin AFB by tempering the cold northern winds of winter and causing cool sea breezes during the daytime in the summer. The average annual temperature at Eglin is 68 degrees Fahrenheit (°F). Average monthly temperatures range from 51 °F in January to 82 °F in July and August. The highest average daily maximum temperature is 89 °F in July and August, and the lowest average daily temperature is 42 °F in January. Annual rainfall averages approximately 62 inches, occurring primarily in the summer and late winter or early spring. Historically, the heaviest rainfall occurs during July at an average of 7.7 inches, and the lowest occurs in October at an average of 3.5 inches. Most of the summer rainfall is from scattered showers and thundershowers that are often heavy and last only 1 or 2 hours.

Prevailing winds are usually from the north in winter and from the south in summer with an annual average wind speed of five knots. January, February, March, April, and December are the windiest months with an average wind speed of six knots. July and August have the lowest average velocity winds at four knots. During summer, a moderate sea breeze usually blows off the Gulf of Mexico, and occasional strong winds come from thunderstorms.

The characteristic patterns of local air movement in the Eglin area are illustrated by the annual wind rose shown in Figure 3-3 and the 3-month wind roses provided in Figures 3-4 and 3-5. Wind roses are compass-type plots of the frequencies of wind speeds and directions over a specified period. The wind rose provides a graphical description of the prevailing winds, giving the frequency of occurrence (percent occurrence) of different wind speed and wind direction combinations for a specific location and over a given time period. It shows the number of wind speed and direction observations, expressed as a percentage, which had a particular direction and speed during the summary period. Wind roses are shown here because the potential drift of simulants and interferants would be impacted by prevailing winds. These figures indicate expected wind direction and speed, which can be used to determine timing of JBPDS test operations.

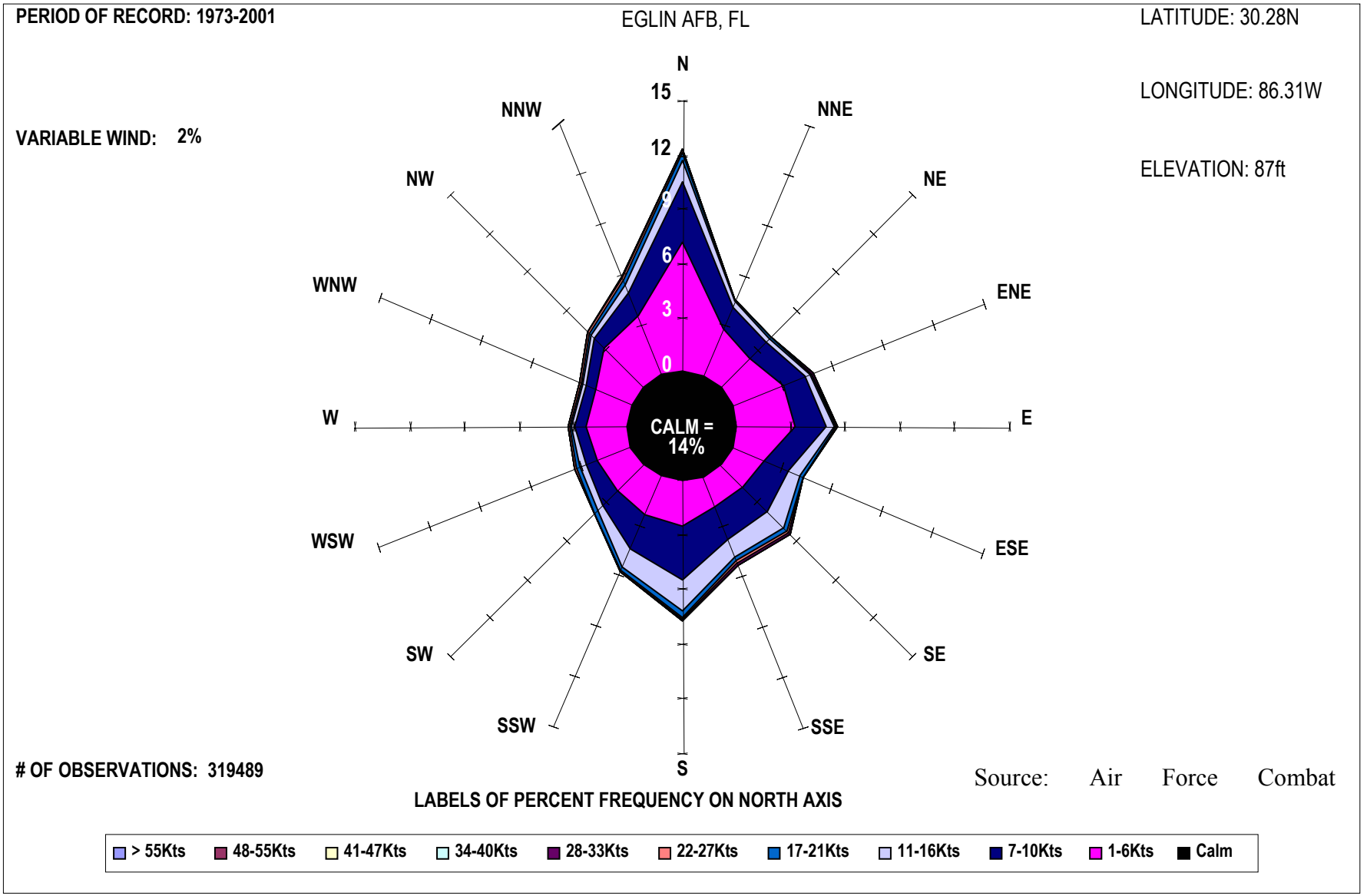
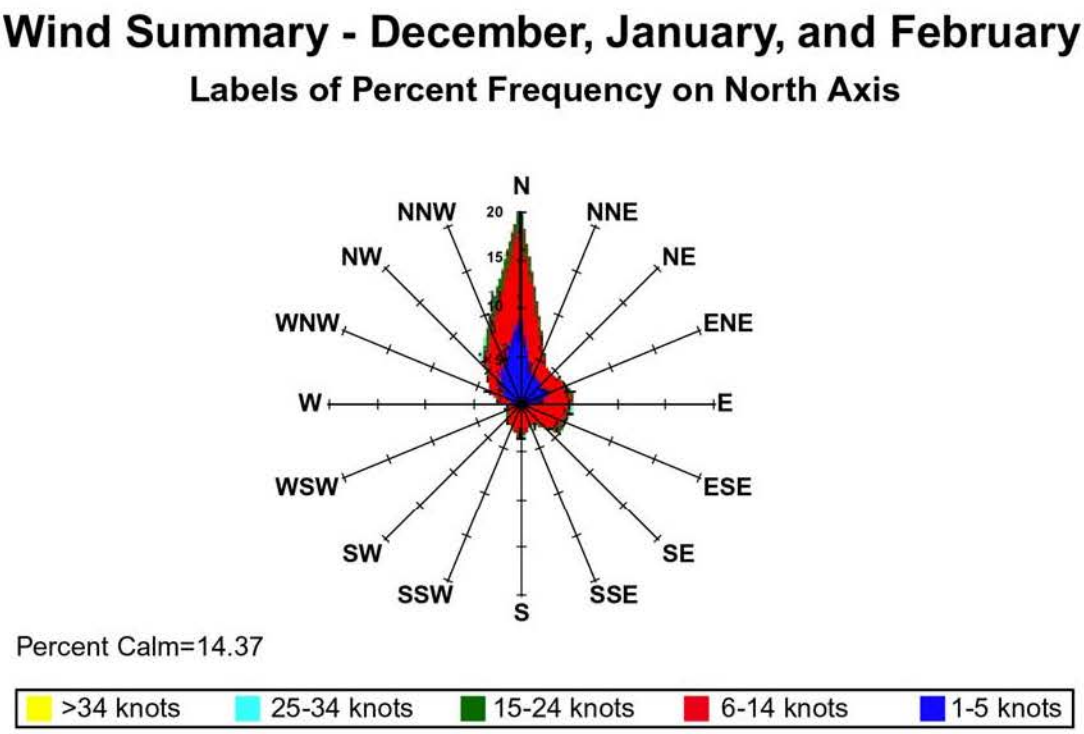


Figure 3-3. Annual Wind Rose for the Eglin Area



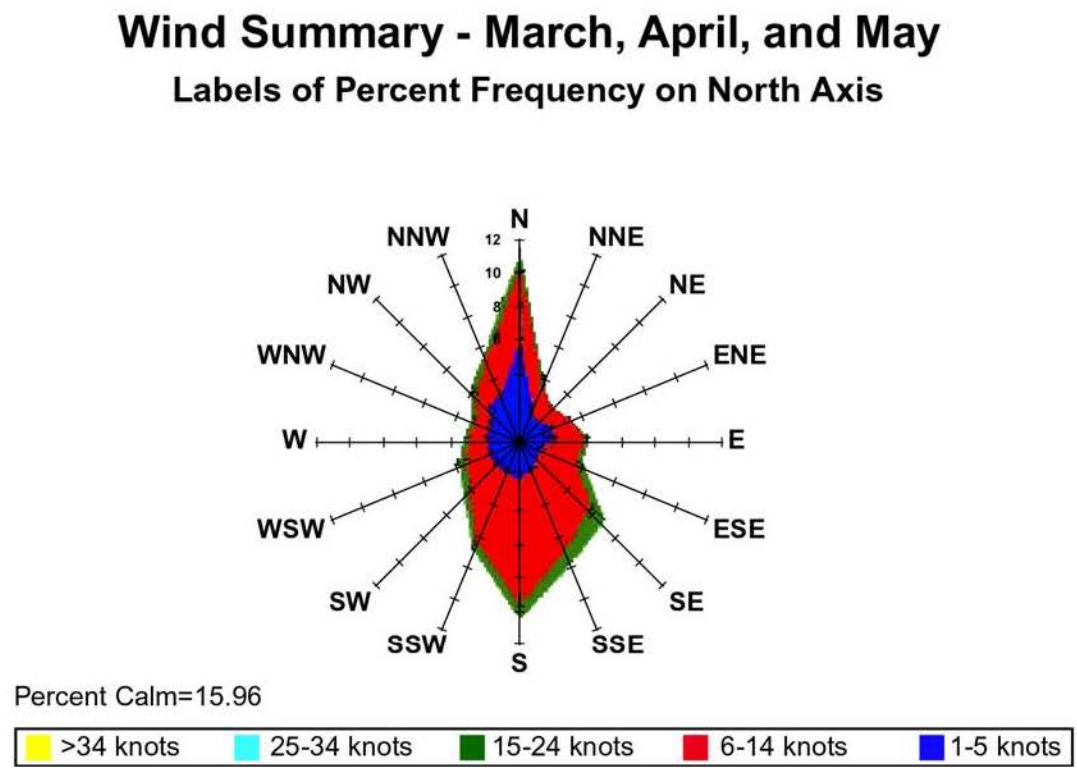


Figure 3-4. Wind Roses for the Eglin Area for December to February (Top), and March to May (Bottom)

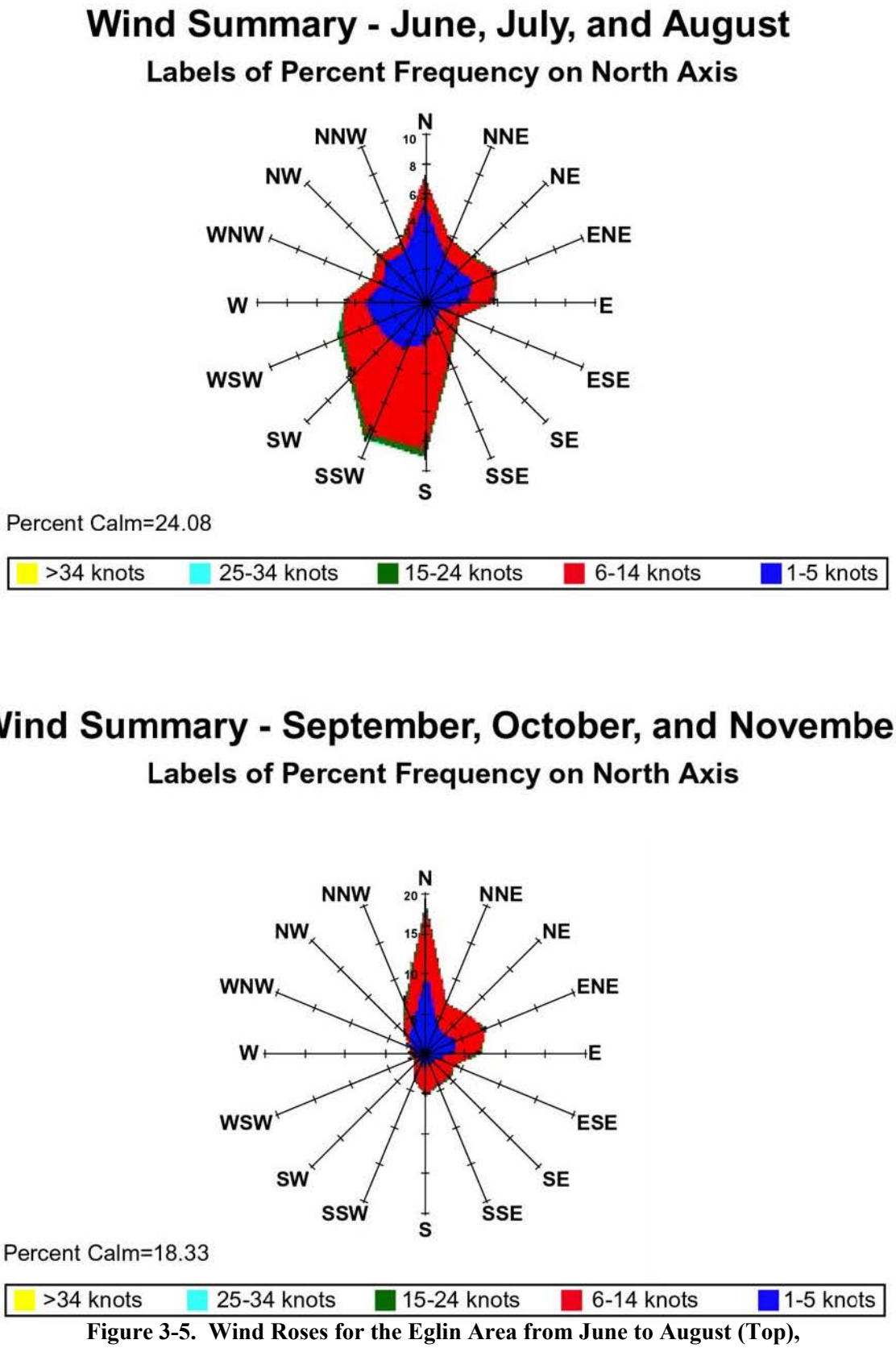


Figure 3-5. Wind Roses for the Eglin Area from June to August (Top), and September to November (Bottom)

3.7 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies analyze the impacts of federal activities on historic properties. Mitigative measures are developed to minimize impacts. Defining resources that will possibly be impacted aids project planners and managers in decision-making for project site location to avoid delays necessitated by additional investigation and/or consultation

Past surveys of Eglin AFB have indicated the presence of archaeological sites on the installation. Survey reports are filed with the Base Historic Preservation Officer (BHPO) or the Cultural Resources Division (EMH) and the State Historic Preservation Officer (SHPO). High probability areas for archeological sites are located on Santa Rosa Island, near Test Areas A-10 to A-15. An archeological survey is currently underway to delineate sites.

4. ENVIRONMENTAL CONSEQUENCES

4.1 LAND USE

4.1.1 Proposed Action: JBPDS Testing at Multiple Test Sites

All actions are contained within Eglin AFB property that is dedicated to military missions and testing use. Activities to be conducted under the Proposed Action and Alternative Action would be within the parameters of the established land use of the test area; therefore, land use conflicts are not likely to occur.

4.1.2 Alternative 1: JBPDS Testing at A-15, B-12, B-71

Testing would take place on a subset of test Eglin AFB test areas. Less coordination of activities associated with this alternative for JBPDS testing would be required than for the use of multiple test sites. Land use impacts are not likely to occur.

4.1.3 No Action Alternative

JBPDS testing would not take place, thus no impacts would occur.

4.2 CHEMICAL AND BIOLOGICAL MATERIALS/HAZARDOUS MATERIALS

Testing would involve the use of hazardous materials to include diesel fuel and BT. Storage, transport, and handling of hazardous material would need to be coordinated with AAC/EMC. All spills and accidental discharges of petroleum, oils, lubricants, chemicals, hazardous waste, or hazardous materials, regardless of the quantity, must be reported. A spill discharge report must be filled out. The responsible party must hand carry or fax (882-3761) this spill report to AAC/EMC, Bldg 696, within 4 duty hours of the spill occurrence. Any spill that poses a threat to life, health, environment, or has the potential to cause a fire, will be reported to 96 CEG/CEF by dialing 911. If the Fire Department declares an emergency condition, they can take control of the situation, including the tasking of the organization's cleanup detail. Spills over 25 gallons are required to be reported to the Florida Department of Environmental Protection (through AAC/EMC). Smoke grenades will be used during obscurant testing. Explosives storage and transport is an ongoing part of the test environment on Eglin AFB. The transportation of explosive ordnance from Eglin Main to other areas of the reservation is governed under Air Force Manual (AFMAN) 91.201, *Explosive Safety Standards* and DOD 6055.9-STD, *Ammunition and Explosives Safety Standards*. All handling of grenades before, during, and after training would be in accordance with Air Force regulations. The likelihood of subsequent soil contamination from smoke grenades would be nominal, considering the management requirements and small quantity used in testing. Any excess waste from this process must be properly handled, managed, disposed of, or recycled, if applicable, following federal, state, or local (Eglin AFB) requirements. Activities should be coordinated with AAC/EMCP (882-7671). A summary of the environmental fate and transport of the materials to be dispersed to the environment and the potential health effects from exposure is presented in Table 4-1. A detailed analysis is located in Appendix A.

Table 4-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Biological Simulant			
Enterobacteria Phage MS2 (MS2)	MS2 is a positive-strand ssRNA virus that infects *Escherichia coli* (*E. coli)* bacteria only and is found in the intestinal flora of mammals. Because it is encountered wherever fecal contamination occurs, it is commonly used as an indicator of water quality (U.S. Army and U.S. Navy, 2001).	MS2 does not cause disease in humans or animals.	No adverse impacts to human health are anticipated from simulant testing with MS2, as the organism does not cause disease in humans or animals.
***Bacillus globigii* (*Bacillus subtilis* var. *niger*) (BG)**	*Bacillus globigii* (BG) is naturally found in soils worldwide and is most frequently spread by wind and dust storms. Enzymes produced by BG facilitate nutrient recycling in the environment as it extracts nutrients from and decomposes dead organic matter.	BG is classified as non-pathogenic to healthy individuals. It is not considered to be pathogenic or toxic to animals or plants. BG enzymes may induce allergic reactions in individuals who are repeatedly exposed.	No adverse impacts to human health are anticipated from simulant testing with BG, as the organism does not cause disease, nor is it toxic to humans. Due to the potential for allergic reaction it is recommended that susceptible on-site personnel wear protective equipment. Adverse impacts from the use of BG are not expected.
***Bacillus thurigiensis* var. *kurstaki* and var. *israelensis* (BT)**	*Bacillus thurigiensis* (BT) occurs naturally in soils and the crystalline protein is highly insoluble under ambient conditions. BT is moderately persistent in soils. Microbial pesticides such as BT are classified as immobile because they do not migrate or leach to groundwater. BT is active for 48 hours in water, after which it settles out or adsorbs to organic matter. On foliage, BT exposed to sunlight breaks down in about 8 hours.	BT is insoluble under normal conditions and the protein must be activated to have an effect, is considered safe to humans, higher animals, and most insects. Occupational exposures of BT var. *kurstaki* can cause inflammation of the skin and eyes. Numerous laboratory tests have been performed on animals resulting in very few negative effects. It has not been reported to be toxic to plants.	When applied using standard operating procedures, BT should not have any adverse human health impacts; however, it is lethal to some insect species.
Ovalbumin (OV)	Egg ovalbumin is an egg protein that would readily decompose in the environment.	Adverse health effects from inhalation and exposure to dust may cause irritation to the respiratory tract, eyes, and skin upon contact. Allergic reactions in certain sensitive individuals (especially children) may develop upon exposure. OV is considered a non-hazardous substance.	OV is a non-hazardous material. It is recommended that individuals sensitive to egg protein wear protective equipment if involved in test dispersal. No adverse impacts are expected.
***Erwinia herbicola* reclassified as *Pantoea agglomerans* (EH)**	EH is found in orchards and is a common micro flora on fruits and vegetables. Populations of *P. agglomerans* isolates may also be present in a variety of habitats. Information on the environmental fate and transport of EH is limited.	*P. agglomerans* is ubiquitous and can be isolated from plants, animals, soils, and water. Scientists have been using isolates of the bacterium as biocontrols for over 50 years with no reported adverse. Manufacturers found that no harm resulted from exposure to *P. agglomerans* strain C9-1.	Based on the limited exposure area and the assumption that *P. agglomerans* is found naturally in all environments, it is not anticipated that the microorganism would elicit human health impacts from dispersal on test areas.

Table 4-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
		Dispersants	
Cabosil	Cabosil is an inert, extremely fine particle sized silicon dioxide ($Si0_2$). Environmental fate and transport data is limited however, it is not soluble in water, nor is it mobile in soil.	Short-term inhalation effects from Cabosil include temporary discomfort. High dust levels may induce irritation to eyes and drying of skin. This material is not listed as a carcinogen and has shown no mutagenic, reproductive or teratogenic effects. Cabosil has been approved by the U.S. Food and Drug Administration (FDA) for many food applications as both direct food additive and as a substance allowed in the manufacture of materials that come in direct contact with food.	Cabosil is a non-hazardous material used commonly as a thickener in food preparation. It is not expected that amounts would exceed regulatory requirements during application, nor should concentrations accumulate at appreciable levels. No adverse impacts are anticipated.
Syloid	Syloid is a synthetic, amorphous, silicon dioxide (SiO2) gel that is completely inert and insoluble except in strong bases.	Syloid is listed as a non-toxic and non-hazardous material. Silica gel injected intratracheally in rats has not been demonstrated to cause fibrosis, nor have inhalation exposures. Dietary exposure is believed to be insignificant from a toxicological standpoint.	Human health risk from exposure to silicon gel is low. Additionally, here is no evidence that the use of silicon gel in accordance with approved labeling presents a hazard to non-target organisms or the environment.
		Tracers	
Propylene Gas	If released to the atmosphere, **propylene** will exist in the vapor-phase where it will be broken down quickly. Hydrolysis, bioconcentration, adsorption, and biodegradation are not expected to be important fate processes of **propylene** in soil or aquatic ecosystems. Propylene gas is highly volatile and fairly insoluble in water.	Inhalation of gas at high levels may cause fatigue, confusion, unconsciousness, paralysis, and irregular heart activity. Effects from exposure are seen when the gas displaces oxygen in inhaled air (usually in enclosed spaces), which can result in asphyxiation and may lead to death.	The majority of propylene gas released would disperse in the atmosphere and be degraded fairly rapidly. The concentrations of propylene gas released during test procedures should not reach saturation levels that would create adverse impacts to human or ecological health.
Sulfur hexafluoride Gas (SF_6)	SF_6 gas is several times heavier than air and thus, may collect in low-lying areas. However, the accumulation may be negligible due to its rapid atmospheric dispersion. It may be transported to soil via wet deposition.	Because of its non-flammability low toxicity, low reactivity, and ease of detection, SF_6 has been widely used as a tracer **gas** for both indoor and outdoor source dissemination experiments. SF_6 is biologically inert but can be a simple asphyxiant from the displacement of oxygen from the air. Other effects from overexposure include dizziness and headache.	The use of SF_6 gas should not result in harm to human health or terrestrial/aquatic biota. The release of SF_6 gas when used as a tracer should dissipate rapidly to the atmosphere via wind currents. No adverse environmental impacts are anticipated from the use of this non-toxic gas.
		Interferants	
Kaolin Dust	Kaolin is a fine clay resulting from weathering of aluminous minerals that contain kaolinite. After dispersion it settles to the ground or surface water, where it becomes part of the soil or sediment like other clay minerals. It is transported by erosion as a minor constituent in soil (U.S. Air Force, 1997).	Exposure to high levels of kaolin dust may cause injury to skin or mucous membranes and has been associated with respiratory effects.	Because it is a naturally occurring mineral that is a constituent of many soils and because it is non-toxic it is frequently used at Eglin AFB in training activities (U.S. Air Force, 1997). Kaolin is not likely to cause significant harm to humans or ecological receptors, thus adverse impacts from JBPDS testing are not anticipated.

Table 4-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Hexachlooethane (HC) Smoke/Signal Smoke – Smoke Pots and Grenades	It is assumed that HC is entirely consumed and not transported in the smoke cloud (U.S. Air Force, 1997). A by-product, zinc chloride vapor, released by combustion rapidly condenses to droplets in the atmosphere and is transported and deposited to the ground or surface waters. The chloride ion is prevalent in nature and generally innocuous in the environment. Zinc may absorb to soil and vegetation where it could be absorbed or ingested by biota.	Exposures to zinc chloride dust may cause irritation to skin and mucous membranes. Low levels of exposure may result in irritation of nose and throat, chest pain, cough and nausea. Extremely high levels may result in hospitalization, pulmonary effects and death.	HC smoke from grenades and pots is frequently used on Eglin test areas (U.S. Air Force, 1997). HC smoke is potentially hazardous to humans and terrestrial animals under certain conditions, which are dependent upon the concentration and duration of the smoke cloud. However, deployment of HC smoke in unconfined spaces is unlikely to reach harmful levels. To prevent impacts, care must be taken to follow appropriate procedures that prevent inhalation exposure during testing activities.
Combustion Gases - Burning Diesel, Burning Vegetation, Burning Rags	Primary chemical constituents released from burning diesel, vegetation and rags include carbon dioxide (CO_2), carbon monoxide (CO) and nitrogen oxides (NO_X). CO_2 dissolves to form carbonic acid, which dissociates to hydrogen, bicarbonate and carbonate ions. These constituents are dissolved in the atmosphere and transported by wind currents, eventually being deposited by wet deposition.	CO_2 is considered harmless in the open atmosphere and is toxic to animals only at high concentrations (>300,00 mg/L), when it displaces oxygen and prevents its transfer to hemoglobin (U.S. Air Force, 1997). CO can prevent the transfer of oxygen to animal tissues causing asphyxiation. Extreme NO_2 exposure may result in pulmonary edema or death as a result of inflammation of the lungs.	Humans and animals are exposed to combustion gases CO_2, CO and NO_X frequently from aircraft and land-based vehicles on Eglin AFB and off base. Exposure to these routine emissions is far greater than that from projected production during JBPDS test activities. Adverse environmental impacts are not anticipated.

4.2.1 Proposed Action: JBPDS Testing at Multiple Test Sites

It is not anticipated that usage of biological simulants (BG, BT, ovalbumin, MS2, EH), tracers (propylene gas and SF_6), and interferants (kaolin dust, HC smokes, burning diesel, burning vegetation, burning rags), or dispersants (Cabosil, Syloid) tested during the Proposed Action would adversely impact human health when standard operating procedures for use are followed. Potential health effects (irritation, allergic reactions) would be limited to on-site personnel who are sensitive to a specific material being dispersed. The use of protective equipment would alleviate potential impacts from exposure. The release of simulants and interferants would be short-term, minimal, and localized to B-12, B-70, and B-71. Thus, the migration of biological and chemical materials to surrounding communities is highly unlikely.

Any cleaning of the dissemination equipment will be performed on site. Common light cleaning agents and water will be used and the cleaning process will not produce residue that would be classified hazardous.

4.2.2 Alternative 1: JBPDS Testing at A-15, B-12, B-71

Restricting the use of test areas would not alter potential impacts of JBPDS testing. Potential human-health effects (irritation, allergic reactions) remain the same for on-site personnel who may be sensitive to the remaining chemical and/or biological materials. The use of protective equipment would alleviate potential impacts from exposure.

4.2.3 No Action Alternative

The test would not be conducted. Therefore, no impacts would occur.

4.3 SOILS

Environmental fate and transport information for the simulants, dispersants, tracers, and interferants are summarized in Table 4-1 and detailed in Appendix A.

4.3.1 Proposed Action: JBPDS Testing at Multiple Test Sites

JBPDS testing would not involve displacement of soil other than for placement of a few grounding rods. No digging or boring is required for these test activities. Thus, there would be insignificant belowground or surface soil disturbance as a result of the Proposed Action, as activities would take place along established locations and roads at test areas.

The release of biological simulants, interferants, tracers, and dispersants creates the potential for particulate migration and adsorption to soil. Studies have shown that diesel fuels/exhaust and BT have a tendency to persist in soils, showing half-lives that range from days to months depending upon soil characteristics and environmental conditions (Table 4-1 and Appendix A). Potential impacts may include a decline in the quality of soils underlying such activities resulting from simulant and interferant dispersal. Potential impacts should be short-term based on the

characteristics of soils on Eglin AFB, which are sandy, well drained, and of a low organic carbon content, factors that negate the potential for materials to persist in the soil.

LCACs – Santa Rosa Island

Within the context of the Proposed Action, LCACs would only come into contact with the land surface at the shoreline while landing at Santa Rosa Island test areas. LCAC landings are not anticipated to result in adverse impacts to soils, as these craft are essentially hovercraft. An LCAC dune crossing study conducted on Shoal Point, Panama City, Florida (SAIC, 1998), concluded that a maximum of 0.75 inches of sand was displaced after two consecutive passes of an LCAC within the same vicinity, with little to no impacts to dune vegetation. No improvements would be required to accommodate these landings. Erosion impacts at the land-water interface on Santa Rosa Island from LCAC landings are not anticipated.

Equipment Setup and Personnel Movement – Santa Rosa Island

Equipment setup and personnel movement in dune habitats should be avoided. These areas are very sensitive to disturbance, and destruction of dune vegetation can result in adverse impacts to the dune environment, resulting in erosion of dunes and accelerated island dynamics. As a result, only cleared areas or pads should be used for closed box testing of the JBPDS.

4.3.2 Alternative 1: JBPDS Testing at A-15, B-12, B-71

Eliminating the use of certain test ranges would not alter potential impacts to soils during JBPDS testing.

4.3.3 No Action Alternative

The test would not be conducted. Therefore, no impacts would occur.

4.4 WATER QUALITY AND WETLANDS

Potential pathways for released materials to enter the water are through:

- Settling of particles on the water surface
- Settling of particles on soil, then leaching into groundwater
- Dissolution of the materials in rainwater, then transferal to a water body

4.4.1 Proposed Action: JBPDS Testing at Multiple Test Sites

Although most of the biological and chemical materials proposed for release are not expected to degrade water quality, information on some materials was limited. Due to this uncertainty regarding the potential water quality impacts of some of the materials, certain precautions are recommended for handling and dispersal. Environmental fate and transport information for all materials is listed in Table 4-1 and Appendix A.

Biological and chemical materials would be handled and distributed in strict accordance with label instructions and safety standards. Certain safety precautions need to be taken when materials are being loaded, including loading the materials to the trucks on a concrete pad and covering any storm water drains near the concrete pad. It is recommended that spill response kits (pads and boons) be available. Any environmental spill must be reported to the Spill Response Manager. Within 4 hours of the spill event, a spill response form must be faxed (882-7675) to AAC/EMC. With these management practices in place, the likelihood of spills entering the water drainage system would be negligible. As a result, potential impacts to the water quality of surface and groundwater resources in the area resulting from spills associated with the Proposed Action are not anticipated.

To avoid water quality or habitat impacts to surface waters during testing, ground vehicles releasing BT and EH should maintain at least a 1,000-foot buffer from water bodies on Test Areas B-12, B-70, and B-71 (Figure 4-1). This 1,000-foot buffer is based on the slope elevation near the water bodies. Materials that settle on the slope can run off into water bodies at the bottom of the slope during rain events, and slope areas are vulnerable to soil erosion. When crossing streams within the 1,000-foot buffer or when within 1,000 feet of wetlands, ground dispersal equipment should be turned off (Figure 4-1). With observance of these buffers at Test Areas B-12, B-70, and B-71, it is highly unlikely that there would be any impacts to water quality or habitat from ground releases. No release buffers are necessary for the A- test areas on Santa Rosa Island, Elgin Main Operating Airfield, or McKinley Climatic Laboratory because all releases at these sites will be contained within plexiglass enclosures.

The JBPDS apparatus should not be located within 1,000 feet of any water body on Test Areas B-12, B-70, or B-71 to avoid water quality problems. At the Santa Rosa Island, A- test areas, Eglin Main Operating Airfield, and McKinley Climatic Laboratory, the plexiglass enclosure would be set up at established testing areas. The system should be set up on paved surfaces at all sites. On Test Areas B-12, B-70, and B-71, Eglin Main Operating Airfield, and McKinley Climatic Laboratory, vehicles would remain on roads or established tracks at all times to avoid potential impacts to riparian and wetland habitats or water quality. On Santa Rosa Island, the LCAC would pull up to the road area of A-13B, where the trucks would offload onto paved surfaces. The trucks would stay on paved surfaces as they transit to various test sites on the island, and all activities would remain within established test site boundaries on the island. With these practices in place, no water quality or habitat impacts from erosion are anticipated from the JBPDS apparatus, plexiglass enclosure, or vehicles.

Aerial releases are planned for Test Areas B-12, B-70, and B-71. BG and OV, which are the only materials proposed for aerial release, are not expected to cause any negative impacts to water quality.

4.4.2 Alternative 1: JBPDS testing at A-15, B-12, B-71

Impacts would be the same as those under the Proposed Action.

4.4.3 No Action Alternative

The test would not be conducted. Therefore, no impacts would occur.

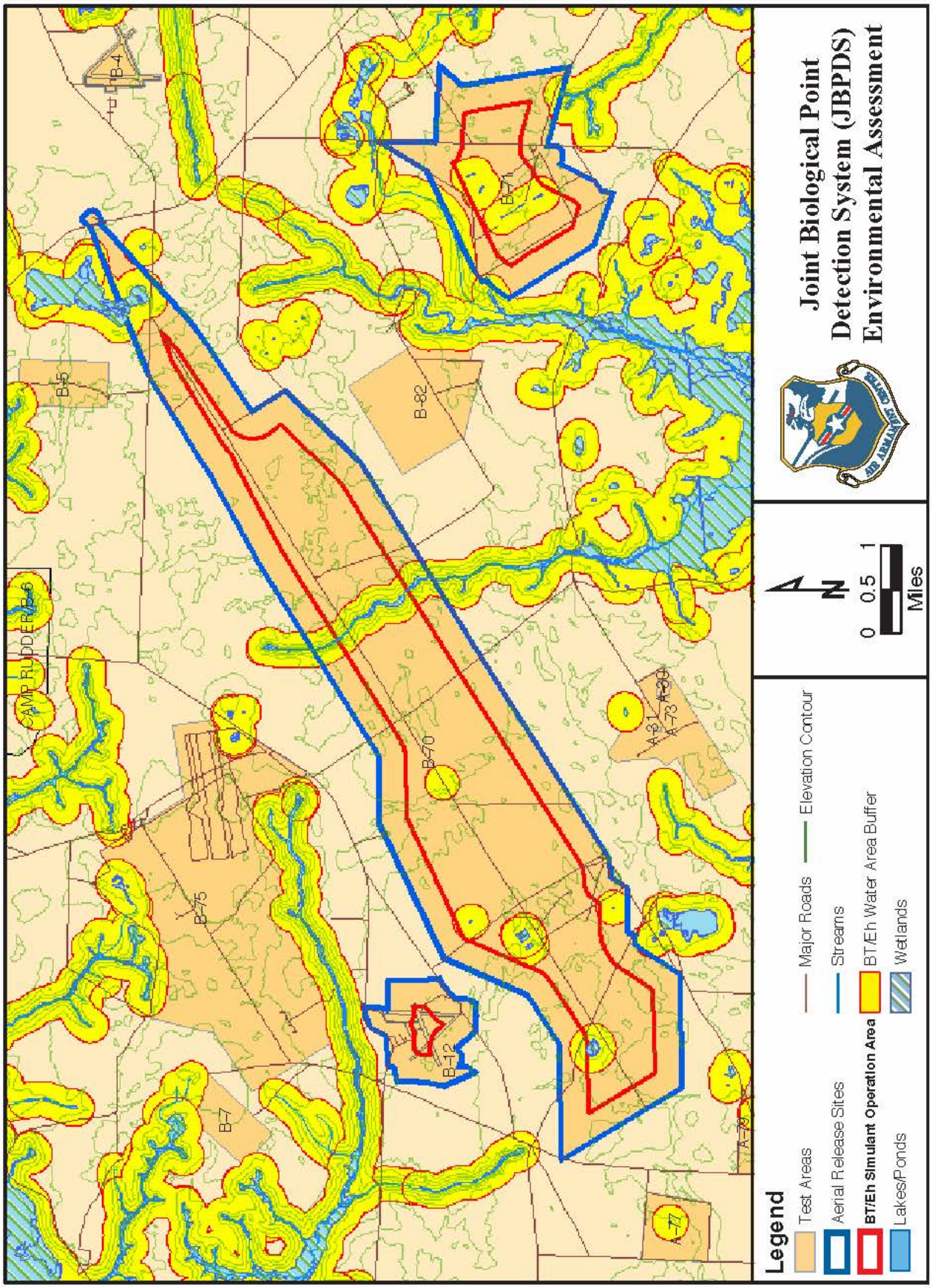


Figure 4-1. Water Body Buffer Areas

4.5 BIOLOGICAL RESOURCES

The analysis in this section will attempt to define the area and species potentially affected directly or indirectly by the expenditure of simulants and their additives and interferants into the air and the use of test-related equipment (i.e., LCAC use). Additives include dispersants and tracers. LCAC use would occur at Test Area A-13B on Santa Rosa Island twice per test period (once to drop off the equipment, once to pick up equipment).

4.5.1 Proposed Action: JBPDS Testing at Multiple Test Sites

Potential Impacts to Biological Resources from LCAC Use

Impacts to biological resources from LCAC use are not anticipated. LCAC use would be infrequent (twice per test period), and disturbance to surface soil would be minimal (Section 4.3). Landings would not occur at night during sea turtle nesting season (May–October). Additionally, landings would not occur before the morning turtle survey is completed during nesting season. Activities would be coordinated with AAC/EMSN for turtle nest avoidance.

Impacts to Biological Resources from Simulants

The simulants ovalbumin, MS2, BG, and EH have not been found to be pathogenic to wildlife or insects. These simulants are not anticipated to affect biological resources or sensitive species on the Eglin Reservation and thus are not analyzed in detail. The only areas that would experience outdoor releases of simulants would be Test Areas B-12, B-70, and B-71. The only simulant that would have potential effects on biological resources is BT.

BT releases would occur by the following methods, previously discussed in Chapter 2:

- **Ground Line:** ground standoff distances of 400 meters or more in which a disseminator is moved by vehicle or manpower up or down some path (road) of dissemination.
- **Point:** ground close-in (100 meters or less) releases in which the disseminator is not moved in a path but is static unless wind changes warrant.

Release type and amounts of BT are summarized in Table 4-2. There would be no aircraft releases of BT.

Table 4-2. Amounts of BT by Release Type

Material	Release Type	# of Releases	Amount per Release	Total Amount/ Test	Total Amount/Year (6 Tests/Year)	Total Amount/ 5 Year Program
Dry *Bacillus thuringiensis* (BT)	Ground line	20	20 g	400 g, 0.4 kg	2.4 kg	12 kg
	Point	100	1 g	100 g, 0.1 kg	0.6 kg	3 kg
Total Dry BT					***3 kg***	***15 kg***
Wet BT	Ground line	20	20 liters per release at 50 g/L	400 liters, 20 kg	120 kg	600 kg
	Point	50	2 liters per release at 5 g/L	100 liters, 500 g, 0.5 kg	3 kg	15 kg
Total Wet BT					***123 kg***	***615 kg***
Total BT = 21 kg					***126 kg***	***630 kg***

g = grams
g/L = grams per liter
kg = kilograms

Impacts to Biological Resources from BT

The analysis in this section considered potential impacts to insects, primarily moths, caterpillars, and aquatic insects, which are the animal groups most at risk for potential impacts from BT. Potential impacts to animals that feed on these species were also considered. Details of the analysis are presented in Appendix B. The strain of BT to be used in the Proposed Action is *Bacillus thuringiensis* var. *kurstaki* (BTk), which is the active ingredient in multiple agricultural insecticides, including Dipel 2x. The BTk used in simulant tests would most likely be obtained as Dipel 2x, since it is readily available and of low cost. In agricultural applications, BTk toxins are only effective when ingested by the larval stage (caterpillars) of the target insects, and manufacturers recommend spraying shortly after leaf emergence and the appearance of the caterpillars.

Bacillus thuringiensis var. *israeliensis* (BTi), which targets different insect groups than BTk, may also be used in simulant tests. Overall, the BT strains that are proposed for use in simulant tests at Eglin appear to have few direct short-term environmental effects, with the exception of impacts to target insect species. Material Safety Data Sheets (MSDS) cite low toxicity to humans, wildlife, and nontarget species (C&P Press, 2001). There is one case where BTk may have caused or contributed to an infection when a farmer accidentally splashed Dipel into his eye (Joung and Cote, 2000).

For point and line releases, which would occur at Test Areas B-12, B-70, and B-71, most of the releases would occur along test area roads and airfields, and though some drift is expected, the highest concentrations of BT would be expected to occur on or around the roads and airfields. Open grassland/shrublands dominate the test area landscapes, and rare insect species are unknown within these open grassland/shrublands. Wildlife that feed on insects would be able to forage in other parts of these test areas and in other nearby test areas.

Point and line releases consist of minor amounts of simulants, and any effects on larval insects and their predators would be limited to a small area.

The maximum single release of BT at any given time would be 20 grams at either B-12, B-70, or B-71, and some impacts to insect species are anticipated. However, there would be no significant impacts to insect populations as a whole or to animals that feed on these species, given that the majority of the simulant would fall on cleared (i.e., open grassland/shrubland) test areas or, in the case of B-71, an asphalt surface. Release onto the asphalt surface would allow for more direct exposure to sunlight and, thus, quicker degradation of the toxin. However, a substantial rainfall event or series of events would probably introduce greater quantities of BT toxin into West Branch than would occur if the release did not occur on the asphalt grid.

Birds on the test areas where releases occur may experience a decrease in food availability during certain times of the year but should be able to forage elsewhere, given the availability of other grassland/shrubland habitat and the fact that not all of the surface area of the test release area would be affected. Some environmental concerns exist with the long-term repeated use of BT as little information is available. Some scientists have stated that the target insects (i.e., moths) may over time develop a resistance to BT. Soil microbiota may be affected by the persistence of BT in soils (ECOTOXNET, 1996).

Fish in Holley Creek, Turtle Creek, Live Oak Creek, and West Branch may be exposed to BT and may experience some temporary decrease in food availability from the effects of BT on aquatic insects. The repeated use of BT over a 5-year period may alter the ecology of some segment of these streams, but this depends on several factors. Fast-moving waters would be less affected than still waters, as flushing of BT would occur and the coarser sandy sediments of fast moving streams would not bind BT toxins to the degree that silty sediments of slow-moving or still surface waters would. The exact amounts of BT toxins that would be input into streams is unknown but would vary depending on the time of year, the orientation of aerial delivery, amount of rainfall, and amount of direct sunlight available to break down the BT toxin. Given the distance between test areas and these streams, substantial breakdown of the toxin is anticipated before it reaches the streams.

A review of the diets of sensitive species found within or near the test areas indicated that red-cockaded woodpeckers (RCWs), gopher frogs, gopher tortoises, and burrowing owls should not be impacted by the Proposed Action. The literature reviewed showed that moths and caterpillars were not considered an essential part of the diet of any of the sensitive species found on these test areas. RCWs feed primarily on roaches and do not feed in open grassland/shrublands, gopher frogs feed on invertebrates and toads, gopher tortoises primarily feed on grasses and legume fruit, and burrowing owls feed primarily on crickets, beetles, and grasshoppers.

For Test Area B-12, a release at a roughly east-west heading during high wind events would potentially cause part of the simulant cloud to be released directly into forage areas and active cavity trees of the RCW. Since the majority of this species' diet does not consist of insects susceptible to BT (i.e., moths, caterpillars), no effects should result to RCWs from loss of prey species. Limiting the releases at Test Area B-12 to the 8-knot wind release speed would not result in any deposition of simulant onto RCW forage areas. A north-south orientation of the

release over Test Area B-12 would probably directly deposit BT into Holley Creek, where effects to certain aquatic insect species (midge and fly larvae) would occur. It is recommended that north-south aerial releases at Test Area B-12 be avoided.

No federally protected species would be affected in Holley Creek. There are no Okaloosa darters in this water body and it does not connect to any darter streams. At B-70, a release of the same orientation as Centerline Road would allow for sufficient space to conduct the test while avoiding all surface waters and RCW habitat. Burrowing owls at B-70 may be directly exposed to BT releases, but their food sources should not be affected and toxicity from contact would not occur.

There are no streams that traverse B-71; thus, the Okaloosa darter would not be impacted.

No releases would occur at C-72; thus, the Okaloosa darter would not be affected.

Impacts to Biological Resources from Dispersants

Cabosil and Syloid Silicas

Cabosil and Syloid silicas are thickening and flow control agents used in conjunction with the biological simulants to aid in their dispersal. Cabosil is nontoxic to fish at concentrations greater than 10,000 mg/L (parts per million) and nontoxic to freshwater crustaceans at concentrations equal to or greater than 1,000 mg/L (parts per million)

The cumulative or combined effects of the silicas with the BT simulant is unknown.

Impacts to Biological Resources from Tracers

Propylene Gas

Thirty ground releases of 10,000 liters would occur per year over the 5-year period. Effects to biological resources from propylene gas are unlikely, given the mild toxicity of this gas and the localized effect area it would occupy. The area occupied by 10,000 liters is equivalent to a cube approximately 7 feet by 7 feet by 7 feet. Repeated inhalation of the gas would be required for adverse effects. No sensitive species should be exposed in the open/grassland areas of B-12, B-71, and B-70. Dispersion of the gas and atmospheric mixing would begin immediately upon release.

4.5.2 Alternative 1: JBPDS Testing at A-15, B-12, B-71

Alternative 1 differs from the Proposed Action in that Test Area B-70 would not be used. Not having Test Area B-70 as an option would mean that BT amounts and associated effects on larval insects would increase at B-12 and B-71 and in adjacent surface waters. Assuming even distribution of simulant tests at each of the test areas, the average number of tests at B-12 and B-71 would increase from 1.3 per year to two if B-70 were eliminated as a potential test location. This 46 percent increase in activity at B-12 and B-71 represents a direct increase in the amount of BT deposited on these test areas.

4.5.3 No Action Alternative

The test would not be conducted. Therefore, no impacts would occur.

4.6 CULTURAL RESOURCES

4.6.1 Proposed Action: JBPDS Testing at Multiple Test Sites

No cultural resource impacts would occur at B-12, B-70, B-71, or C-72. High probability cultural resource areas are located on Santa Rosa Island, near Test Areas A-10 to A-15. An archeological survey is currently underway to delineate these areas. If personnel or equipment traverse dunes or nonestablished areas, consultation with AAC/EMH is warranted. However, for JBPDS testing, equipment setup and personnel movement would occur only on established areas, such as paved or concrete pads and roads. Thus, no cultural resource impacts are anticipated.

4.6.2 Alternative 1: JBPDS Testing at A-15, B-12, B-71

No cultural resource impacts would occur at Test Areas B-12 or B-71. High probability cultural resource areas may exist at A-15. An archeological survey is currently underway to delineate areas on Santa Rosa Island (A-15). If personnel or equipment traverse dunes or nonestablished areas, consultation with AAC/EMH is warranted. However, for JBPDS testing, equipment setup and personnel movement would occur only on established areas, such as paved or concrete pads and roads. Thus, no cultural resource impacts are anticipated.

4.6.3 No Action Alternative

The test would not be conducted. Therefore, no impacts would occur.

4.7 CUMULATIVE IMPACTS

Eglin test areas proposed for JBPDS are typically utilized for live fire events. Cumulative impacts associated with JBPDS testing and current Eglin training activities should not be significant as current land use has the potential to cause more impacts than the less intrusive JBPDS activity. However, reasonably foreseeable testing similar to JBPDS includes the SANDIA Standoff Detection System testing event, which is currently being evaluated under separate NEPA documentation. The SANDIA event would utilize similar simulants on TA B-70; thus potential cumulative impacts associated with the use of simulants on the Eglin range for JBPDS and SANDIA are analyzed below. Quantities of proposed simulant use for JBPDS and SANDIA are presented in Table 4-3.

Table 4-3. Simulant Quantities for JBPDS and SANDIA Testing on Eglin Ranges

	JBPDS	**SANDIA**	**Total**
Frequency	6 tests per year for 5 years	1 test: summer of 2003 for a 2-week period	
Test Areas of Outdoor Simulant Release	B-12, B-70, B-71	B-70	
Simulant Materials	**Simulant Amount per Test**		
BG	37 kg	1.5 kg	38.5 kg
BT	21 kg	1.0 kg	22 kg
EH	240 liters	75 liters	315 liters
MS_2	160 liters	75 liters	235 liters
Ovalbumin	50 kg	2 kg	52 kg
Simulant Amount per Year*			
BG	222 kg	1.5 kg	223.5 kg
BT	126 kg	1.0 kg	127 kg
EH	1,140 liters	75 liters	1,215 liters
MS_2	960 liters	75 liters	1,035 liters
OV	300 kg	2 kg	302 kg

*SANDIA testing will only occur one time in the summer of 2003. JBPDS testing may take place 6 times per year.

Percent Net Change - Simulant Release

With the inclusion of the SANDIA simulant test amounts (Table 4-3) to the JBPDS, the following net change in simulant use was determined.

- BG 0.67 %
- BT 0.79 %
- EH 6.17 %
- MS_2 7.25 %
- OV 0.66 %

The potential net change when including SANDIA simulant use would not create significant cumulative impacts to test area B-70. There is also a high probability that the simulants used during SANDIA testing in the summer of 2003 will have biodegraded prior to JBPDS testing in the fall.

5. PLAN, PERMIT, AND MANAGEMENT REQUIREMENTS

The following is a list of the plan, permit, and management requirements associated with the Proposed Action. The need for these requirements were identified by the environmental analysis process of this EA and were developed through cooperation between the proponent and interested parties involved in the Proposed Action. These requirements are, therefore, to be considered as part of the Proposed Action and would be implemented through the Proposed Action's initiation.

Plans

Spill Prevention Control and Countermeasure Plan
Hazardous Waste Management Plan
Storm Water Prevention Plan

Permits

None

Management Requirements

Prior to JBPDS testing operations, activities that are near Eglin flight lines should be coordinated with 46 OSS/OSAO (882-2614) to assure proper flight line driving/radio procedures are briefed and to verify placement location of equipment.

Chemical and Biological/Hazardous Materials

Standard operating procedures for handling, transporting, and storing the biological simulants (BG, BT, ovalbumin, MS2, EH) and interferants (fog juice, colored smoke, diesel exhaust) tested during the Proposed Action must be followed to protect human health. The use of protective equipment would alleviate potential impacts from exposure.

Any excess or waste from this process must be properly handled, managed, and disposed of or recycled, if applicable, IAW federal, state and local (Eglin AFB) requirements. Coordinate with AAC/EMCP (Ms Dawn Robeen - 882-7671). The storage, transport, and handling of hazardous materials (smoke grenades, diesel fuel, and BT) would need to be coordinated with AAC/EMC, and these materials would need to be disposed of appropriately according to state requirements and AAC Plan 32-5, *Hazardous Waste Management Plan*. The handling of these materials must follow standard safety protocols and hazardous material storage and handling procedures set forth by AAC/EMC. Hazardous materials must be labeled and properly stored. Should more than 55-gallon containers be used to store fuel, secondary containment to hold up to 110 percent of the storage capacity is required. It is recommended that spill response kits (pads and boons) be available. Any environmental spill must be reported to the Spill Response Manager. Within four hours of the spill event, a spill response form must be faxed (882-7675) to AAC/EMC. Any generated waste must be handled using standard operating procedures for hazardous waste disposal.

The transportation of explosive ordnance from Eglin Main to other areas of the reservation is governed under Air Force Manual (AFMAN) 91.201, *Explosive Safety Standards*, and DOD 6055.9-STD, *Ammunition and Explosives Safety Standards*. Explosives storage areas must be sited according to Air Force requirements, and portions of public roads that periodically serve as routes for explosive-laden vehicles to facilitate Eglin AFB activities are established according to strict Air Force safety requirements. All handling of grenades before, during, and after training would be in accordance with Air Force regulations.

Any excess waste from this process must be properly handled, managed, disposed of, or recycled, if applicable, following federal, state, or local (Eglin AFB) requirements. Activities should be coordinated with AAC/EMCP (882-7671).

Soils

Vehicles are to remain on established roads and tracks during dispersal activities to avoid potential soil erosion impacts.

Water Quality and Wetlands

Simulants and interferants would be handled and distributed in strict accordance with label instructions and safety standards. Certain safety precautions need to be taken when materials are being loaded, including loading the materials to the trucks on a concrete pad and covering any storm water drains near the concrete pad. It is recommended that spill response kits (pads and boons) be available. Any environmental spill must be reported to the Spill Response Manager. Within 4 hours of the spill event, a spill response form must be faxed (882-7675) to AAC/EMC.

To avoid water quality or habitat impacts to Live Oak Creek, Bull Pond, Holley Creek, Turtle Creek, and West Branch during testing, vehicles releasing BT and EH would maintain at least a 1,000-foot buffer from water bodies. Vehicles would remain on roads or established tracks at all times to avoid potential impacts to riparian and wetland habitats. When crossing Live Oak Creek on Centerline Road within the 1,000-foot buffer or when within 1,000 feet of Bull Pond on any roads, dispersal equipment would be turned off.

The Florida Department of Environmental Protection has advised the Proponent to allow for 48 hours between predicted or expected rainfall and planned use of *Bacillus thuringiensis*, Permethrin, and colored dyes when possible due to runoff after heavy rain events (see Appendix E). The proponent will avoid use of these materials when there is a 70-percent or greater chance of heavy rainfall (>0.3 inches/hour according to the National Weather Service) occurring near the project area within 48 hours of the test

Biological Resources

Restricting the release of BT and EH to outside a 1,000-foot buffer around water bodies should minimize effects aquatic species. It is recommended that no north-south aerial releases at Test Area B-12 be performed to avoid potential impacts to RCW forage areas.

Aerial Releases

- Orient flight such that no surface waters are overflown and such that releases are contained within the test area.
- Distribute the releases over time and over the three available test areas.
- If all releases are scheduled for any one year on any one test area, avoid the spring and summer months so that repeated eradication of larval insects does not occur.
- Shorter track releases (i.e., from speeds of 75 knots) are wholly contained at Test Area B-12 but longer track releases (i.e., from speeds of more than 100 knots) are not and extend into RCW forage areas. While no significant effects are anticipated, avoidance is recommended by using speed scenarios of 75 knots at B-12.
- Follow the insecticide manufacturer's recommendations for reducing drift by considering various environmental conditions (e.g., winds, humidity).
- No north-south aerial releases at Test Area B-12 should be performed to avoid potential impacts to RCW forage areas.

LCAC Landings

Nighttime landings during sea turtle nesting season, avoidance of existing sea turtle nests, ensuring that the sea turtle survey has been completed daily from May 1 through September 1, and ensuring all ruts are removed prior to leaving the beach each day are management requirements of the A-13B LCAC landings at Santa Rosa Island. .

6. LIST OF PREPARERS

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7. LIST OF CONTACTS

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Purpose of Contact: Information regarding hazardous material storage and handling

Mr. Charles Clark
State of Florida Pesticide Registration
Purpose of Contact: The legalities and regulations regarding the outdoor use of biological simulants on Eglin AFB

Ms. Barbara Mandula
USEPA, Office of Prevention, Pesticides, and Toxic Substances
Purpose of Contact: Information on BT, EH, and MS2

Mr. Jim Wheeler
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Purpose of Contact: Information on simulants and interferants

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APPENDIX A

ENVIRONMENTAL FATE AND TRANSPORT, HEALTH EFFECTS, AND EXPOSURE ASSESSMENT FOR BIOLOGICAL AND CHEMICAL MATERIALS

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Biological Simulant			
Enterobacteria Phage MS2 (MS2)	MS2 is a positive-strand ssRNA virus that infects *Escherichia coli* (*E. coli)* bacteria only and is found in the intestinal flora of mammals. Because it is encountered wherever fecal contamination occurs, it is commonly used as an indicator of water quality (U.S. Army and U.S. Navy, 2001).	MS2 does not cause disease in humans or animals.	No adverse impacts to human health are anticipated from simulant testing with MS2, as the organism does not cause disease in humans or animals.
Bacillus globigii (*Bacillus subtilis* var. *niger*)	*Bacillus globigii* (BG) is naturally found in soils worldwide and is most frequently spread by wind and dust storms. Enzymes produced by BG facilitate nutrient recycling in the environment as it extracts nutrients from and decomposes dead organic matter. BG shows a capacity to grow over a wide range of temperatures, including that of the human body, but does not appear capable of colonizing human systems. Based on environmental conditions in which it can survive, it may temporarily inhabit skin and the gastrointestinal tract, but it is not thought to be able to colonize other sites of the body.	BG is classified as nonpathogenic to healthy individuals in the Centers for Disease Control/ National Institute of Health, Microbiological, and Biomedical Laboratory Guidelines (CDC/NIH, 1999). Following extensive review, USEPA formulated a final decision for Toxic Substances Control Act (TSCA) exemption for BG (USEPA, 1997). The USEPA describes *B. subtilis* as a benign organism that does not possess traits that cause disease and is noninfectious. Laboratory studies with rats, guinea pigs, and rabbits exposed to aerosol and interperitoneal exposures at very high concentrations resulted in no adverse indications of hypersensitivity or ongoing infection (U.S. Army and U.S. Navy, 2001). It is not considered to be pathogenic or toxic to animals or plants (USEPA, 1997). A BG enzyme, subtilisin, which is used in laundry detergents, may be associated with cases of respiratory and dermal allergic reactions to laundry products that contained the enzyme (USEPA, 1997), and this enzyme may induce allergic reactions in individuals who are repeatedly exposed (U.S. Army and U.S. Navy, 2001).	No adverse impacts to human health are anticipated from simulant testing with BG, as the organism does not cause disease, nor is it toxic to humans. However, due to the potential for allergic reaction to cellular proteins in BG, it is recommended that on-site personnel who might be susceptible to allergic reaction to the simulant wear protective equipment. Adverse impacts from the use of BT are not expected.

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Bacillus thurigiensis var. *kurstaki* and var. *israelensis*	*Bacillus thurigiensis* (BT) occurs naturally in soils and the crystalline protein is highly insoluble under ambient conditions. BT is moderately persistent in soils with a half-life of about 4 months (ECOTOXNET, 1996). Spores released into soils from decomposing dead insects that have ingested BT are rapidly inactivated when soil pH is below 5.1. Microbial pesticides such as BT are classified as immobile because they do not migrate or leach to groundwater. Due to its rapid biological breakdown and immobility, it is not considered a threat to groundwater (ECOTXNET, 1996). The USEPA does not restrict the use of BT around water bodies. It is considered active for 48 hours in water, after which it settles out or adsorbs to organic matter. On foliage, BT exposed to sunlight breaks down in about 8 hours.	BT forms spores that can survive adverse conditions. During spore formation, crystalline bodies are formed. It becomes soluble at high pHs (>9.5) that facilitate the release of the active toxin. Thus, when eaten, the spores and crystals act as poisons in the target insects that have the optimal high pH in their midgut. Because BT is highly insoluble under normal conditions and the protein must be activated to have an effect, is considered safe to humans, higher animals, and most insects. Studies have reported that humans exposed to 1,000 milligrams (mg)/day showed no adverse effects from BT (ECOTOXNET, 1996). Occupational exposures of BT var. *kurstaki* resulted in irritation, burning, swelling and redness of the skin and eyes (ECOTOXNET, 1996). Numerous laboratory tests have been performed on animals resulting in very few negative effects. It was not lethal to birds, dogs, guinea pigs, mice, or rats. It was found to be an eye irritant to test rabbits when 100 grams was applied to their eyes. Lung irritation from BT var. *kurstaki* was observed in test animals exposed to 10.35 mg/L for four weeks (ECOTOXNET, 1996). It has not been reported to be toxic to plants and does not alter seed germination or plant growth (ECOXOXNET, 1996).	BT does not persist in the digestive tract of mammals that ingest it. It has not been shown to cause reproductive, teratogenic, mutagenic, or carcinogenic effects to animals. When applied using standard operating procedures, BT should not have any adverse human health impacts, however, it is lethal to some insect species.
Ovalbumin	Egg ovalbumin is an egg protein that would readily decompose in the environment.	Adverse health effects from inhalation and exposure to dust may cause irritation to the respiratory tract, eyes, and skin upon contact. Allergic reactions in certain sensitive individuals (especially children) may develop upon exposure. Ovalbumin is considered a nonhazardous substance and may be disposed of in public sewer systems.	Ovalbumin is a nonhazardous material. It is recommended that individuals sensitive to egg protein wear protective equipment if involved in test dispersal. No adverse impacts are expected.

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Erwinia herbicola reclassified as *Pantoea agglomerans* (EH)	EH is found in orchards and is a common micro flora on fruits and vegetables. Populations of *P. agglomerans* isolates may also be present in a variety of habitats. Information on the environmental fate and transport of EH is limited.	In a pesticide petition to the USEPA, manufacturers of BlightBan C9-1, which contains 71% *P. agglomerans,* supplied a toxicity profile and safety determination (Federal Register, 1997). The results of studies indicated that *P. agglomerans* strain C9-1 had an acute oral toxicity greater than 5 grams/kilogram (g/kg) body weight in rats and an acute dermal toxicity of greater than 2 g/kg body weight in rabbits and caused slight to mild skin and eye irritation in rabbits. No toxicity or pathogenicity was shown in rats when administered the bacterium via intratracheal or intravenous routes. Total clearance of the organisms occurred rapidly in all cases. The safety determination revealed that, as a species, *P. agglomerans* was ubiquitous and could be isolated from plants, animals, soils, and water. Additionally, scientists have been using isolates of the bacterium as biocontrols for over 50 years with no reported adverse effects (Federal Register, 1997). Manufacturers found that there is "reasonable certainly that no harm will result from exposure to *P. agglomerans* strain C9-1 (Federal Register, 1997). USEPA states that EH has not been approved for use as a pesticide active ingredient, and is therefore not considered a pesticide (Mandula, 2002). The Florida Department of Agriculture stated that there were no outstanding issues, legalities, or regulations relevant to EH dispersal with its department or other appropriate state agencies (Clark, 2002).	Based on the limited exposure area and the assumption that *P. agglomerans* is found naturally in all environments, it is not anticipated that the microorganism would elicit human health impacts from dispersal on test areas.

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Dispersants			
Cabosil	Cabosil is an inert, extremely fine particle sized silicon dioxide ($Si0_2$). Environmental fate and transport data is limited however, it is not soluble in water, nor is it mobile in soil.	Short-term inhalation effects from Cabosil include temporary discomfort. High dust levels may induce irritation to eyes and drying of skin. Data is not available to suggest chronic adverse health effects to humans during occupational exposure. Threshold limit value (TLV) and permissible exposure limit (PEL) values are set at 10-mg/cubic meter (mg/m^3) (Eager Plastics, 2002). Long-term inhalation studies involving insoluble solid particles have resulted in chronic inflammation, lung fibrosis and tumors in rats; however, synthetic fumed silica was not used in these studies. This material is not listed as a carcinogen and has shown no mutagenic, reproductive or teratogenic effects. The lethal dose in 50% of a population (LD50) is > 5,000 mg/kg for acute oral rat and acute dermal rabbit. Acute toxicity studies aquatic invertebrates reveal a 24-hour no observable effects concentration (NOEC) of > 10,000 mg/L for *Daphnia magna* (water flea) (Eager Plastics, 2002). Cabosil has been approved by the FDA for many food applications as both direct food additive (up to 2% by weight) and as a substance allowed in the manufacture of materials that come in direct contact with food (Eager Plastics, 2002).	Cabosil is a nonhazardous material used commonly as a thickener in food preparation. It is not expected that amounts would exceed TLV or PEL requirements during application, nor should concentrations accumulate at appreciable levels. USEPA has assessed silicon dioxide and concluded that there is no evidence to suggest that the use of this material would present a hazard to nontarget organisms or the environment (USEPA, 1991). No adverse impacts are anticipated.
Syloid	Syloid is a synthetic, amorphous, silicon dioxide (SiO2) gel that is completely inert and insoluble except in strong bases.	Syloid is listed as a nontoxic and nonhazardous material. Silica gel injected intratracheally in rats has not been demonstrated to cause fibrosis, nor have inhalation exposures. Dietary exposure is believed to be insignificant from a toxicological standpoint (USEPA, 1991).	USEPA has concluded that human health risk from exposure to silicon gel is low. Additionally, here is no evidence that the use of silicon gel in accordance with approved labeling presents a hazard to nontarget organisms or the environment (USEPA, 1991).

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Tracers			
Propylene Gas	If released to the atmosphere, propylene will exist in the vapor-phase. Vapor-phase propylene may be degraded by ozone (half-life of 24 hours), nitrate radicals (half-life of 4 days), or photochemically produced hydroxyl radicals (estimated half-life of 14.6 hours). (TOXNET, 2003) Hydrolysis, bioconcentration, adsorption, and biodegradation are not expected to be important fate processes of propylene in soil or aquatic ecosystems. Propylene gas is highly volatile and fairly insoluble in water. The volatilization half-life from a model river has been estimated to be 1.9 hours. The volatilization half-life from a model environmental pond can be estimated to be 23 hours. Propylene may have medium mobility in soil and sediment. The high vapor pressure suggests that the gas may permeate through soil (TOXNET, 2003).	Some sources of propylene are biological in origin; it is a component of garlic essential oils, European fir, Scots pine, natural gases, and it is released by germinating beans, corn, cotton, and pea seeds. Propylene's release is widespread since it is a ubiquitous product of incomplete combustion (TOXNET, 2003). Inhalation of gas at high levels may cause fatigue, confusion, unconsciousness, narcosis (paralysis), and irregular heart activity. Effects from exposure are seen when the gas displaces oxygen in inhaled air (usually in enclosed spaces), which can result in asphyxiation and may lead to death.	The majority of propylene gas released would disperse in the atmosphere and be degraded fairly rapidly. The concentrations of propylene gas released during test procedures should not reach saturation levels that would create adverse impacts to human or ecological health.

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Sulfur hexafluoride Gas (SF_6)	SF_6 gas is several times heavier than air and thus, may collect in low-lying areas. However, the accumulation may be negligible due to its rapid atmospheric dispersion. It may be transported to soil via wet deposition. Photochemical reactions and degradation are impeded by fluoride atoms, which make the gas very stable. The atmospheric lifetime is several hundred years. SF_6 should volatilize rapidly from water, making bioaccumulation in aquatic biota quite low. **SF_6** is expected to have high mobility in soil. **SF_6s** lack of adsorptivity is one characteristic that makes it an ideal tracer **gas** (TOXNET, 2003).	Because of its non-flammability low toxicity, low reactivity, and ease of detection, it has been widely used as a tracer **gas** for both indoor and outdoor source dissemination experiments (TOXNET, 2003). OSHA has established an 8-hour time weighted average (TWA) exposure limit of 1000 ppm. SF_6 is biologically inert but can be a simple asphyxiant from the displacement of oxygen from the air. Human exposure to an 80% sulfur fluoride, 20% oxygen breathing atmosphere for 5 minutes produced only a peripheral tingling sensation, mild excitement, and altered hearing (TOXNET, 2003). Other effects from overexposure dizziness and headache.	The use of SF_6 gas should not result in harm to human health or terrestrial/aquatic biota. The release of SF_6 gas when used as a tracer should dissipate rapidly to the atmosphere via wind currents. No adverse environmental impacts are anticipated from the use of this nontoxic gas.
Interferants			
Kaolin Dust	Kaolin is a fine clay resulting from weathering of aluminous minerals that contain kaolinite as the principal constituent. Kaolinite is a mineral consisting of hydrous silicate of aluminum. After dispersion it settles to the ground or surface water, where it becomes part of he soil or sediment like other clay minerals. It is transported by erosion as a minor constituent in soil (U.S. Air Force, 1997).	Exposure to high levels of kaolin dust may cause injury to skin or mucous membranes and has been associated with respiratory effects. The OSHA has established PELs of 10 mg/m^3 (total particulate) and 5 mg/m^3 (respirable particulate) as 8-hour time weighted averages (TWA) for kaolin (CDC, 2002).	Because it is a naturally occurring mineral that is a constituent of many soils and because it is nontoxic, it is frequently used at Eglin AFB in training activities (U.S. Air Force, 1997). Kaolin is not likely to cause significant harm to humans or ecological receptors, thus adverse impacts from JBPDS testing are not anticipated.

Table A-1. Environmental Fate and Transport, Health Effects, and Exposure Assessment for Biological and Chemical Materials Cont'd

Material	Environmental Fate and Transport	Health Effects	Exposure Assessment
Hexachlooethane (HC) Smoke/Signal Smoke – Smoke Pots and Grenades	HC smoke is a mixture of hexachloroethane, zinc oxide, and aluminum and burns to release a dense white smoke that contains primarily zinc chloride, with small amounts of amorphous carbon, and aluminum oxide. It is assumed that hexachloroethane is entirely consumed and not transported in the smoke cloud (U.S. Air Force, 1997). Zinc chloride vapor released by combustion rapidly condenses to droplets in the atmosphere. It is transported in air and deposited to the ground or surface waters. The chloride ion is prevalent in nature and generally innocuous in the environment. Zinc may absorb to soil and vegetation where it could be absorbed or ingested by biota.	Humans and biota may be exposed to HC smoke (zinc chloride vapor) by inhalation, plant deposition or ingestion. Exposures to zinc chloride dust may cause irritation to skin and mucous membranes. Low levels of exposure (160-240 mg-min/m^3) may result in irritation of nose and throat, chest pain, cough and nausea (U.S. Air Force, 1997). Accidental exposures of 3,500 mg-min/m^3 to 61,000 mg-min/m^3 to exposed men resulted in hospitalization, pulmonary effects and death. Intravenous injections of zinc chloride at 60-90 mg/kg was lethal to rats. The TLV for zinc chloride is 1 mg/m^3 and the immediately dangerous to life and health (IDLH) level is 2,000 mg/m^3. Exposure to plants at a rate of one M-8 hand grenade over an area of ~7.2 m^2 (~77 ft^2) of land surface is likely to be harmful to sensitive species of trees (U.S. Air Force, 1997).	HC smoke from grenades and pots is frequently used on Eglin test areas (U.S. Air Force, 1997). HC smoke is potentially hazardous to humans and terrestrial animals under certain conditions, which are dependent upon the concentration and duration of the smoke cloud. However, deployment of HC smoke in unconfined spaces is unlikely to reach harmful levels. To prevent impacts, care must be taken to follow appropriate procedures that prevent inhalation exposure during testing activities.
Combustion Gases - Burning Diesel, Burning Vegetation, Burning Rags	Primary chemical constituents released from burning diesel, vegetation and rags include carbon dioxide (CO_2), carbon monoxide (CO) and nitrogen oxides (NO_X). CO_2 dissolves to form carbonic acid, which dissociates to hydrogen, bicarbonate, and carbonate ions. These constituents are dissolved in the atmosphere and transported by wind currents, eventually being deposited by wet deposition.	Carbonate from dissociated CO_2 is a major constituent of many naturally occurring minerals and is crucial for maintaining pH balance in soil, surface water and biological tissues. CO_2 is considered harmless in the open atmosphere and is toxic to animals only at high concentrations (>300,000 mg/L), when it displaces oxygen and prevents its transfer to hemoglobin (U.S. Air Force, 1997). CO can prevent the transfer of oxygen to animal tissues causing asphyxiation. Forms of NO_X (NO, N_2O_3, and N_2O_5 are not considered significant toxicants. N_2O is a mild anesthetic and is not otherwise harmful. However, NO_2 exposure may result in pulmonary edema or death as a result of inflammation of the lungs (U.S. Air Force, 1997).	Humans and animals are exposed to combustion gasses CO_2, CO, and NO_X frequently from aircraft and land-based vehicles on Eglin AFB and off base. Exposure to these routine emissions is far greater than that from projected production during JBPDS test activities. Adverse environmental impacts are not anticipated.

APPENDIX B

INFORMATION ON BT IMPACTS TO BIOLOGICAL RESOURCES

INFORMATION ON BT IMPACTS TO BIOLOGICAL RESOURCES

BT toxins degrade rapidly in sunlight but may persist in soils. Studies have shown BT may persist in the soil 12 to 16 months after application but with decreasing toxicity (Joung and Cote, 2000). Soils with a high clay content are better at binding the toxin, but eventually release does occur. Soils on the proposed test areas are primarily Lakeland soils, which have a high sand content and are characterized by high permeability and rapid drainage.

Insects, and in particular, moths, butterflies, and their larval form of the caterpillars, and aquatic insects could be affected by BT, which is a biological insecticide that targets different groups of insects depending on the strain. BT can also affect nonpest insects and animals that feed on target species, either directly or through a decrease in prey species. For example, Swadener (1994) documented multiple occurrences where BTk affected beneficial insects including the reduction of egg production in a parasitic wasp that preys on meal moths, reductions in aphid-eating flies after a crop application of Dipel, mortality of the cinnabar moth, which is used to control ragwort, and mortality of a moth that helps control aquatic weeds.

The specific effects of BT may be beneficial or negative depending on the species. Plants, and the animals that depend on those plants, may benefit from the decrease in moths or caterpillars that feed on the plants. For example, one study noted that tent caterpillars, which can impact the growth of certain oaks, indirectly impacted the availability of food for squirrels and bears by affecting acorn production (Swadener, 1994). However, negative impacts can result when beneficial nontarget species are affected, causing secondary impacts such as localized decreases in pollination for some plant species.

Studies have documented that animals that feed on moths and caterpillars targeted by BTk may experience a localized decrease in food availability. In Oregon and New Hampshire, researchers found that following spray programs with BTk, birds (chickadees, black-throated warblers, and blue-throated warblers) in treated areas brought fewer caterpillars to their nests than birds in untreated areas (Swadener, 1994). A Canadian study found that a decrease in the numbers of caterpillars after BTk treatments was followed by a reduction in the numbers of two bird species (Swadener, 1994). In another case, Dipel treatments contributed to a change in population structure of shrews, where adult males left the treatment area and adult females and juvenile males remained (Swadener, 1994). The shrews that remained within the study area showed a shift in prey preference from caterpillars to alternative food sources.

BTi has been found to be toxic to certain aquatic insects, including chironomids (a type of fly larva) and midges (Swadener, 1994). Given that animals such as fish and frogs feed on aquatic insects, including the federally protected fish, the Okaloosa darter, they may be affected by a decrease in food availability as a result of BTi applications if water bodies are impacted.

APPENDIX C

IRP SITE INFORMATION

Table C-1. IRP Sites Located Within Proposed Test Areas

Test Area (located on or near)	Site	Location	Description
A-11A	LF-22	Located south of Hurlburt Field on Santa Rosa Island, ~6.9 miles west of the base gate. North of A-11A.	LF-22 encompasses ~0.5 acre. Empty, rusted cans and drums were historically present along the edge of the disposal site. Landfill operations took place during the 1960s and 1970s and consisted of hardfill, metal spools, waste oil, and empty solvent drums. Site closure consisted of covering the wastes with several feet of local sandy soil.
	AOC-94 Closed Storage Bunkers	East of A-11A on Santa Rosa Island	The site consists of two storage bunkers at the A-11 Compound on Santa Rosa Island. These bunkers were identified as potential storage facilities for napalm and its constituents. Reportedly, the bunkers were constructed in the 1950s for vertical probe-sounding rocket testing. Rocket engines and solid propellants were stored in the bunkers between test missions. It was later found that napalm was not stored here.
A-15	ST-259 Water Tower No. 12511	Located on Santa Rosa Island, north of RR-242, across the road from Building No. 12510	ST-259 was constructed in the late 1940s. Paint chip analysis indicated that the water tower was coated with lead-based paint. A Site Investigation (SI) conducted in 1998 showed arsenic above Tier I and Tier II Screening Levels. Five metals were detected at concentrations above their respective base wide background concentrations for surface soils. Eglin AFB recommended stripping and repainting the water tower and that soil samples be collected and analyzed for total lead and arsenic.
	POI-405 Low Level Radioactive Material Site	Located on Santa Rosa Island southwest of A-15	POI No. 405 was identified as a BOMARC missile fragment disposal area. The missile debris as well as other material was uncovered and radioactive debris was separated and placed in approved B-25 boxes. In early 1993 the BOMARC missile debris was removed.
B-12	LDP-36	B-12	The area of concern was inspected and a linear anomaly measuring ~3 ft by 5 ft was found. In the general area, one 500-pound bomb was found on the surface. This linear anomaly is not suspected to be a Legacy Disposal Pit (LDP) but a possible impacted bomb.
	ST-255 Water Tower No. 7100 (POI-365)	Site B-12 Auxiliary Field 7	Previous investigations at other Eglin water towers have shown that lead-based paint chips have impacted surface soils. Water Tower No. 7100 was constructed in the 1940s. During the SI, peelings of paint on the tower and paint chips on the ground surface were observed. The results of an SI performed in 1998 indicated that the surface soils are impacted with arsenic, chromium, and lead. Analysis of the paint on the water tower indicates that lead-based paint had been applied in the past. POI No. 365 is now designated as IRP Site No. ST-255. An ICM will be performed to remove the impacted soils following stripping and repainting of the tower.
	POI-309	Site B-12 Auxiliary Field No 7	The site currently consists of a poorly defined depression lying within a wooded area. In 1994, a pit approximately 6 ft by 4 ft was found to contain rusted paint cans with solidified and liquid paint, rollers, and brushes. All debris (including paint) was removed. Analytical results indicated that all constituents (including lead) were below regulatory standards except one isolated concentration of benzo(a)pyrene that was at a level below the Florida Industrial Soil Cleanup Goal. Therefore, NFA was recommended for the site.
	AOC-08	Auxiliary Field No. 7	The landfill is 6 to 8 acres in size, reportedly inactive, and operated from the 1940s to 1977. Suspected wastes (hardfill and refuse) were disposed of in trenches. Earthen mounds are present in the western and northern parts of the site. Several piles of debris including rusted cans and metal fragments, concrete, glass, asphalt shingles, and asphalt are located in the central and northwest part of the site. Geophysics conducted March 1995 identified anomalies indicative of subsurface metal.
B-70	LDP-37	TA-B-70, location C, end of Range Road by tower	Suspected LDP rumored to be a dump site.

Test Area (located on or near)	Site	Location	Description
	LDP-38	North of TA-B-70	The area is not an LDP. It was rumored to be a disposal site. One rusty metal target drum and one incendiary bomblet were found on the surface.
	LDP-08	Southeast TA B-70	Known to have munitions on the surface, which include bomblets. Due to the large number of bomblets on the surface, a survey was not conducted.
	LDP-09	Southeast TA B-70, south of SR 218, where the road splits into SR 218 and 218B	Known burial site with marked signs. There are metal drums, munitions, and bomblets on the surface. There are large pieces of metal sticking out of the ground, as well as metal drums. The area is 50 by 100 ft in size. Contaminants of concern are synthetic organic compounds (i.e. pesticides and dioxins), volatile organic compounds (chlorides and petroleum hydrocarbons), and inorganics (heavy metals) in soils, sediments, and surface/groundwater.
	LDP-10	Southeast of northern portion of TA B-70.	There are munitions on the surface and partially buried. The area is ~50 ft by 100 ft in size.
	AOC-91 Pocosin Pond Test Area	Pocosin Pond Test Area	Testing of depleted uranium at the Pocosin Pond Test Area began in the early 1960s. Other metals could be present at this site due to conventional munitions exercises. Reportedly, no environmental sampling or monitoring has taken place at this site.
	OT-83 The Cattle Dipping Vat	Located about 540 feet northwest of Test Area B-70.	OT-83 is < one acre in area. Subsurface arsenic contaminated soils were discovered and removed as part of the RFI in 1997. Future hypothetical risks are present at the site; therefore land use constraints were enacted to prevent contact with site subsurface soils.
B-71	LDP-39/40	Located at the northwest boundary of Test Area B-71	LDP-39 consists of a large pile of tires and trash. Easy access appears to have been used by troops training. LDP-40 is a large trash pile of building materials and trash on surface.
	LDP-11	Located at the edge of the woods.	Trash pile ~30 ft by 15 ft in size. There were no munitions found in the area, but there is ammunition packaging material inside the pit. Large blocks of concrete and other building materials are next to the pit.
	LDP-12	Northwest of Test Area B-71	Large pile trash and tires. Easy access appears to have been used by troops training.
C-72	LDP-22	Located on the northeast of Range C-72	The area of concern is on both sides of the road at the entry of the sand/clay pit. There are sandbags from the target area that have been dumped on the edge of the entry of the sand/clay pit. Missile body parts and munitions metal parts are mixed in with the sandbags on the surface.
	LDP-30	Located on the southeast corner on Range C-72	The area of concern is on both sides of the road at the entry of the sand/clay pit. There are sandbags from target areas that have been dumped on the edge of the entry of the sand/clay pit. Missile body parts and munitions metal parts are mixed in with the sandbags and on the surface.
	POI-406	Located on the northeast corner on C-72	Alleged DU Firing Range (20 mm rounds). DU fragments were relatively shallow (0 to 24 inches below ground surface).

AOC – Area of Concern
DU – Depleted Uranium
LDP- Legacy Debris Pit
LF – Landfill
ICM – Interim Corrective Measure
IRP- Installation Restoration Program
NFA – No Further Action
OT – Other Tank
SI – Site Investigation

APPENDIX D

FLORIDA DEPARTMENT OF AGRICULTURE CORRESPONDENCE

Florida Department of Agriculture & Consumer Services
CHARLES H. BRONSON, Commissioner

Please Respond to:
Pesticide Registration Section
3125 Conner Boulevard, Bldg. #6
Tallahassee, Florida 32399-1650
office: (850) 487-2130
e-mail: clarkc@doacs.state.fl.us
fax: (850) 488-5874

November 25, 2002

Ms. Kathyrn Tucker
Environmental Toxicologist
Science Applications
International Corporation
Environmental Science and
Compliance Division
1140 Eglin Parkway
Shalimar, Florida 32579

Dear Ms. Tucker:

SUBJECT: BIOLOGICAL SIMULANT DETECTION TESTING

The details of your November 6, 2002 correspondence were shared with Department staff and appropriate staff in other state agencies. Your request to be advised of any potential legalities/regulations regarding the use of innocuous biological simulants in this testing protocol was noted. Our investigation has found no outstanding issues for SAIC to address as you continue the planning phases of these trials. Eglin Air Force has a good reputation for informing the surrounding communities when such experimental trials are being conducted. Finally, there are no intervening legalities/regulations relevant to your request for this testing during summer of 2003.

If we can be of further assistance please do not hesitate to contact us at the number above.

Sincerely,

CHARLES H. BRONSON
COMMISSIONER OF AGRICULTURE

Charlie L. Clark
Environmental Administrator

CLC/cc

Attachment: November 6, 2002 faxed request

cc: Mr. Steve Rutz
Dr. Dennis Howard
Mr. Dale Dubberly
Dr. Marion Fuller

APPENDIX E

PUBLIC NOTICE AND FLORIDA STATE CLEARINGHOUSE REVIEW COMMENTS

PUBLIC NOTICE

In compliance with the National Environmental Policy Act, Eglin Air Force Base announces the availability of draft Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for RCS 02-680 the Joint Biological Point Detection System test, Eglin Air Force Base, Florida for public review and comment.

The Proposed Action of RCS 02-680, the "Joint Biological Point Detection System," is to test and evaluate the system's performance in detecting the presence of chemical and biological warfare agents by using several harmless biological stimulants and tracers in various environments of Eglin AFB to include coastal, forest, and grassland areas. These areas include the main base airfield and test ranges A-10, A-11, A-12, A-13, A-15, B-12, B-70, B-71 and C-72. Aerial dispersion of stimulants and tracer gas will take place at test ranges B-12, B-70, and B-71. Challenges to the detection system would include both wet and dry aerosols and would consist of both long and short range ground release. Closed box testing will occur on Santa Rosa Island test ranges A-10, A-11, A-12, A-13, and A-15 and McKinley Climatic Laboratory (using cold weather protocols). No agents would be used. The stimulants would include: Bacillus subtilis var. niger (BG), Bacillus thuringiensis (BT), MS2 (a bacteriophage), Ovalbumin (OV), and Erwinia herbicola (EH) Tracers would include propylene and sulfer hexaflouride gases. Interferants would include kaolin dust, signal smoke, hexachloroethane smoke, burning diesel, burning rags and burning vegetation. Testing is proposed to occur up to six times per year for five years.

Your comments on this EA are requested. Letters or other written or oral comments provided may be published in the Final Joint Biological Point Detection System EA. As required by law, comments will be addressed in the Final Joint Biological Point Detection System EA and made available to the public. Any personal information provided will be used only to identify your desire to make a statement during the public comment period or to fulfill requests for copies of he Joint Biological Point Detection System EA. However, only the names and respective comments of respondent individuals will be disclosed. Personal home addresses and phone numbers will not be published in the Joint Biological Point Detection System EA.

Copies of the Environmental Assessments and Finding of No Significant Impact (FONSI) may be reviewed at the Niceville Library, 100 Armstrong Ave., Niceville; Fort Walton Beach Public Library, 105 SE Miracle Strip Parkway, Fort Walton Beach; Navarre Library, 8484 James M. Harvell Rd., Navarre; Crestview Library, 1304 N. Ferndon Blvd., Crestview; and the Destin Library, 8 Stahlman Ave., Destin. Copies will be available for review from Apr. 24, 2003 through May 9, 2003. Comments must be received by May 12, 2003

For more information or to comment on these proposed actions, contact: Mr. Mike Spaits, AAC/EM-PAV, 501 De Leon St. Suite 101 Eglin AFB, Florida 32542-5133 or email: spaitsm@eglin.af.mil. Tel: 850) 882-2878 ext. 333, Fax: (850) 882-3761

520828

Northwest Florida Daily News
Notice

Joint Biological Point Detection System Test

A public notice was published in the *Northwest Florida Daily News* on April 24, 2003 to disclose completion of the Draft EA, selection of the preferred alternative, and request comments during the 15-day pre-decisional comment period.

The 15-day comment period ended on May 9, 2003, with the comments required to this office not later than May12, 2003.

No comments were received during this period.

Mike Spaits
Public Information Specialist

FLORIDA STATE CLEARINGHOUSE REVIEW COMMENTS

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

OFFICE OF INTERGOVERNMENTAL PROGRAMS
OFFICE OF LEGISLATIVE AND GOVERNMENTAL AFFAIRS
FAX TRANSMITTAL FORM

TO: Dr. Paul Bolduc DATE: May 29, 2003

OFFICE: Environmental Analysis Branch LOCATION: Eglin AFB, Florida

FAX #: (850) 882-3761 NUMBER OF PAGES: 9
(including cover sheet)

RE: U.S. Department of Defense - U.S. Air Force - Draft Environmental Assessment - Joint Biological Point Detection System - Eglin Air Force Base, Okaloosa and Santa Rosa Co. SAI: FL200304171681C

FROM: Lauren P. Milligan LOCATION: Douglas Bldg., Mail Station 47

FAX #: (850) 245-2189 PHONE #: (850) 245-2170

"More Protection, Less Process"

Printed on recycled paper.

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

May 27, 2003

Mr. Al Jordan
Environmental Analysis Branch
501 De Leon Street, Suite 101
Eglin AFB, Florida 32542-5133

RE: U.S. Department of Defense - U.S. Air Force - Draft Environmental Assessment - Joint Biological Point Detection System - Eglin Air Force Base, Okaloosa and Santa Rosa Counties
SAI: FL200304171681C

Dear Mr. Jordan:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated the review of the above-referenced Draft Environmental Assessment (EA).

The Department of Environmental Protection (DEP) notes that aquatic insects may be impacted by *Bacillus thuringiensis* due to runoff after rainfall events. Therefore, the Air Force is advised to allow for 48 hours between planned use of these biological agents and predicted or expected rainfall, whenever possible. The proper implementation of this measure and all of the measures outlined in the EA should adequately protect water resources against adverse impacts from dispersed aerosols and vehicles. Please refer to the enclosed DEP comments for further details.

Based on the information contained in the above-referenced draft EA and the comments provided by our reviewing agencies, as summarized above and enclosed, the state has determined that, at this stage, the proposed project is consistent with the Florida Coastal Management Program (FCMP). All subsequent environmental documents prepared for the project must be reviewed to determine the project's continued consistency with the FCMP. The state's consistency concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews.

Thank you for the opportunity to review the project. Should you have any questions regarding this letter, please contact Ms. Rosalyn Kilcollins at (850) 245-2163.

Sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/rk
Enclosures
cc: Dick Fancher, DEP, Northwest District

"More Protection, Less Process"

Printed on recycled paper.

Florida Department of

Memorandum **Environmental Protection**

TO: **Florida State Clearinghouse**

FROM: **Rosalyn Kilcollins, Environmental Specialist**
Office of Intergovernmental Programs

DATE: **May 22, 2003**

SAI: **FL200304171681C - U.S. Air Force - Draft Environmental Assessment - Joint Biological Point Detection System - Eglin AFB - Okaloosa and Santa Rosa Counties**

The Department of Environmental Protection (Department) has reviewed the above-referenced Environmental Assessment (EA) and offers the following comments:

The EA indicates that the Air Force will maintain a 1000-foot buffer around water bodies, use drift reducers, prevent north-south aerial releases at Test Area E-12 to avoid red-cockaded woodpecker habitat, use best management practices regarding vehicles, and adhere to specific safety standard. The Department notes that aquatic insects may be impacted by *Bacillus thuringiensis* due to runoff after rainfall events. Therefore, the Air Force is advised to allow for 48 hours between planned use of these biological agents and predicted or expected rainfall, whenever possible. The proper implementation of all of these measures should adequately protect water resources against adverse impacts from dispersed aerosols and vehicles.

We appreciate the opportunity to comment on the proposed project. Please feel free to call me at (850) 245-2163, if you have any questions or need additional information.

/rfk

Project Information	
Project:	FL200304171681C
Due Date:	MAY 17, 2003
Description:	DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR JOINT BIOLOGICAL POINT DETECTION SYSTEM (JBPDS) - EGLIN AIR FORCE BASE, OKALOOSA AND SANTA ROSA COUNTIES, FLORIDA.
Keywords:	USAF-EGLIN AFB-EA JOINT BIO POINT DETECTION SYSTEM-OKALOOSA/SANTA ROSA
Program:	12.200
Agency Comments:	
WEST FLORIDA RPC - WEST FLORIDA REGIONAL PLANNING COUNCIL	
NC Generally consistent with the WFSRPP.	
OKALOOSA - OKALOOSA COUNTY	
No Final Comments Received	
SANTA ROSA - SANTA ROSA COUNTY	
No Final Comments Received	
ENVIRONMENTAL POLICY UNIT - OFFICE OF POLICY AND BUDGET, ENVIRONMENTAL POLICY UNIT	
No Final Comments Received	
AGRICULTURE - FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES	
No comment	
COMMUNITY AFFAIRS - FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS	
Released Without Comment	
FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION	
No Final Comments Received	
HEALTH - FLORIDA DEPARTMENT OF HEALTH	
No Final Comments Received	
STATE - FLORIDA DEPARTMENT OF STATE	
NC/Consistent	
TRANSPORTATION - FLORIDA DEPARTMENT OF TRANSPORTATION	
NC	
ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	
The EA indicates that the Air Force will maintain a 1000-foot buffer around water bodies, use drift reducers, prevent north-south aerial releases at Test Area B-12 to avoid red-cockaded wood pecker habitat, use best management practices regarding vehicles, and adhere to specific safety standard. The Department notes that aquatic insects may be impacted by Bacillus thuringiensis due to runoff after rainfall events. Therefore, the Air Force is advised to allow for 48 hours between planned use of these biological agents and predicted or expected rainfall, whenever possible. The proper implementation of all of these measures should adequately protect water resources against adverse impacts from dispersed aerosols and vehicles.	
NORTHWEST FLORIDA WMD - NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT	
nc	

For more information please contact the Clearinghouse Office at:

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47

COUNTY: OKALOOSA DATE: 4/17/2003

COMMENTS DUE DATE: 5/17/2003

CLEARANCE DUE DATE: 6/16/2003

SAI #: FL200304171681C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
AGRICULTURE	NORTHWEST FLORIDA WMD	ENVIRONMENTAL POLICY UNIT	
COMMUNITY AFFAIRS			
ENVIRONMENTAL PROTECTION			
FISH and WILDLIFE COMMISSION			
X HEALTH			
STATE			
TRANSPORTATION			

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APR 22 2003
BUREAU OF ONSITE SEWAGE PROGRAMS

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR JOINT BIOLOGICAL POINT DETECTION SYSTEM (JBPDS) - EGLIN AIR FORCE BASE, OKALOOSA AND SANTA ROSA COUNTIES, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA Federal Consistency

- ☐ No Comment
- ☐ Comment Attached
- ☐ Not Applicable
- ☐ No Comment/Consistent
- ☐ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

From:

Division/Bureau: HSES Onsite Sewage Programs

Reviewer: Dale Holcomb

Date: 4-23-2003

RECEIVED
APR 25 2003
OIP/OLGA

COUNTY: OKALOOSA
SAI - UBAF-EA-JBPDS
2003 - 3448

DATE: 4/17/2003
COMMENTS DUE DATE: 5/17/2003
CLEARANCE DUE DATE: 6/16/2003
SAI#: FL200304171681C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
AGRICULTURE	NORTHWEST FLORIDA WMD	ENVIRONMENTAL POLICY UNIT	
COMMUNITY AFFAIRS			
ENVIRONMENTAL PROTECTION			
FISH and WILDLIFE COMMISSION			
HEALTH			
X STATE			
TRANSPORTATION			

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MAY 16 2003
OIP/[illegible]A

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Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

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Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR JOINT BIOLOGICAL POINT DETECTION SYSTEM (JBPDS) - EGLIN AIR FORCE BASE, OKALOOSA AND SANTA ROSA COUNTIES, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA
☑ No Comment
☐ Comment Attached
☐ Not Applicable

Federal Consistency
☑ No Comment/Consistent
☐ Consistent/Comments Attached
☐ Inconsistent/Comments Attached
☐ Not Applicable

From:
Division/Bureau: Division of Historical Resources
Bureau of Historic Preservation
Reviewer: S. Edwards Laura A. Kammerer
Date: 5-14-03 5.14.03

03 APR 21 AM 9:38
RECEIVED
BUREAU OF
HISTORIC PRESERVATION

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
Project Review Form

TO: **State Clearinghouse**
Department of Environmental Protection
3900 Commonwealth Boulevard, MS 47
Tallahassee, FL 32399-3000

DATE: **April 22, 2003**

SUBJECT: Project Review: **Intergovernmental Coordination**
Title: **Department of the Air Force-Draft Environmental Assessment (EA) for Joint Biological Point Detection System (JBPDS) – Eglin Air Force Base, Okaloosa and Santa Rosa Counties, FL**
SAI #: **FL200304171681C**

The District has reviewed the subject application and attachments in accordance with its responsibilities and authority under the provisions of Chapter 373, Florida Statutes. As a result review, the District has the following responses:

ACTION

_x___ No Comment.

____ Supports the project.

____ Objects to the project; explanation attached.

____ Has no objection to the project; explanation optional.

___ Cannot evaluate the project; explanation attached.

____ Project requires a permit from the District under____.

DEGREE OF REVIEW

__x__ Documentation was reviewed.

____ Field investigation was performed.

____ Discussed and/or contacted appropriate office about project.

____ Additional documentation/research is required.

____ Comments attached.

SIGNED Maria Culbertson
Duncan Jay Cairns
Chief, Bur. Env. & Res. Plng.

RECEIVED
APR 29 2003
OIP/OLGA

COUNTY: OKALOOSA

DATE: 4/17/2003
COMMENTS DUE DATE: 5/17/2003
CLEARANCE DUE DATE: 6/16/2003
SAI #: FL200304171681C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
AGRICULTURE	X NORTHWEST FLORIDA WMD	ENVIRONMENTAL POLICY UNIT	
COMMUNITY AFFAIRS			
ENVIRONMENTAL PROTECTION			
FISH and WILDLIFE COMMISSION			
HEALTH			
STATE			
TRANSPORTATION			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

Federal Assistance to State or Local Government (15 CFR 930, Subpart F).
Agencies are required to evaluate the consistency of the activity.

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Project Description:

DEPARTMENT OF THE AIR FORCE - DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR JOINT BIOLOGICAL POINT DETECTION SYSTEM (JBPDS) - EGLIN AIR FORCE BASE, OKALOOSA AND SANTA ROSA COUNTIES, FLORIDA.

Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA Federal Consistency

- ☐ No Comment
- ☐ Comment Attached
- ☐ Not Applicable
- ☐ No Comment/Consistent
- ☐ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

From:
Division/Bureau: NWFWMD Resource Management Div.
Reviewer: Duncan J. Cairns
Date: Date 21 APRIL 03

WFRPC
West Florida Regional Planning Council

WEST FLORIDA REGIONAL PLANNING COUNCIL

Post Office Box 9759 • 3435 North 12th Avenue • Pensacola, Florida 32513-9759
Phone (850) 595-8910 • S/C 695-8910 • (800) 226-8914 • Fax (850) 595-8967

Jeff Caeck
Executive Director

Cody Taylor
Chairman

Sydney Joel Pate
Vice-Chairman

FAX TRANSMITTAL (S) Total # of Pages (including cover): 1

TO: **STATE CLEARINGHOUSE • FAX: (850) 245-2190/(850) 245-2189**
Phone: 850-245-2161

DATE: May 5, 2003

FROM: Jerrie Nelson Lewis, Intergovernmental Review Coordinator
Extension 226
lewisj@wfrpc.dst.fl.us

SUBJECT: State Clearinghouse Review(s) Fax Transmittals:

SAI #	Project Description	RPC #
FE20030417681C	Clearingbouse – Department of the Air Force – Draft environmental assessment for joint biological point detection system – Eglin Air Force Base, Okaloosa and Santa Rosa Counties, Florida.	0612-04-22-2003

X	No Comments – Generally consistent with the WFSRPP
	Comments Attached

If you have any questions, please call.